

**Rare Plant and Vegetation Surveys
2002 and 2003**

Santa Ysabel Ranch Open Space Preserve

Prepared For

**The Nature Conservancy
San Diego County Field Office**

**The County of San Diego
Department of Parks and Recreation**

By

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Southeast view from the northern portion of the West Ranch with snow-frosted Volcan Mountain in the background.

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I. Summary

The Santa Ysabel Ranch Open Space Preserve was established in 2001 from a purchase by The Nature Conservancy from the Edwards Family; the Ranch is now owned by the County of San Diego and managed as a Department of Parks and Recreation Open Space Preserve. It totals nearly 5,400 acres and is comprised of two parcels; an "East Ranch" and a "West Ranch". The East Ranch is east of the town of Santa Ysabel (and Highway 79 running north) and is bordered on the east by Farmer's Road in Julian. The "West" Ranch is west of the town of Santa Ysabel (and Highway 79 running north) and is bordered to the north by Mesa Grande road. The East Ranch is 3,894 acres with an elevation gradient that ranges from 2934 to 4292 feet (894-1308 meters). The West Ranch is 1,512 acres with an elevation gradient from 2720 to 3636 feet (829-1108 meters).

Surveys began March 15, 2002 and ended in November 2003. Surveys took place once to twice a week throughout the growing season (March-September) and once every few weeks outside of the growing season.

Survey areas were those that appeared to have a high potential for rare or unique plants ("hot spots"). These species are referred to in this report as plant "Species of Interest" (^{SI}). Plant "Species of Interest" are identified as those species that are federally or state listed or included on the California Department of Fish and Game's "Special Plants" list (CDFG 2003). They may also be species that have a unique distribution for the area or are otherwise worthy of mention. Plant species were confirmed at the Rancho Santa Ana Botanic Garden (RSABG) Herbarium. Voucher specimens were submitted to the RSABG and the San Diego Natural History Herbaria. GPS coordinates were taken for all Plant Species of Interest and provided to the U.S. Geological Survey for mapping.

Eighteen confirmed Species of Interest were located during the surveys: Banner dudleya (*Dudleya saxosa aloides*), bitter gooseberry (*Ribes amarum*), caraway-leaved gilia (*Gilia* (*Saltugilia*) *caruifolia*), Cleveland sage (*Salvia clevelandii*), Descanso (San Diego) milkvetch (*Astragalus oocarpus*), Engelmann Oak (*Quercus engelmannii*), jewelflower (*Caulanthus heterophyllus heterophyllus*), Kern's brodiaea (*Brodiaea terrestris kernensis*), long-spined spineflower (*Chorizanthe polygonoides longispina*), mountain pink currant (*Ribes nevadense*), Palmer's sagewort (*Artemisia palmeri*), Palomar monkeyflower (*Mimulus* (*diffusus*) *palmeri*), prostrate spineflower (*Chorizanthe procumbens*), San Diego gumplant (*Grindelia hirsutula hallii*), San Felipe monardella (*Monardella nana leptosiphon*), western azalea (*Rhododendron occidentale*), Wright's hymenothrix (*Hymenothrix wrightii*), and yellow (velvety) false lupine (*Thermopsis californica semota*). Plant specimens have been or will be submitted to RSABG herbarium and San Diego Natural History Museum herbarium.

In order to map the vegetation, plant communities were identified using Modified Holland (MoH) (Oberbauer 1996) and the California Natural Diversity Database (CNDDDB) Terrestrial Natural Communities classification system. The CNDDDB system is much more "fine-grained" than the Modified Holland system so many more communities were identified under this system. Generally the major plant communities were: mixed oak/coniferous forest, oak woodlands, oak savanna, chaparral, inland sage scrub, wetland, riparian woodland/forest, native grassland, meadow, non-native (annual) grassland, mixed herb, ruderal, and disturbed.

The topography on the East Ranch is more variable, extreme (steep) and closer to the headwaters of Santa Ysabel Creek. The East Ranch contained higher species and plant community diversity. It also had plant species characteristic of higher elevations and montane-type habitats; however, the East Ranch is lower in elevation to Volcan Mountain and lacks the dominant coniferous and montane element of Volcan Mountain. Large areas of montane plant communities as known from Volcan Mountain do not occur on the preserve. Scattered coniferous species are found on the East Ranch but these communities seem more transitional than climax plant communities. Santa Ysabel Creek "flattens out" before it reaches the West Ranch, through the Mesa Grande area and into Sutherland Reservoir. Vegetatively, the West Ranch is more "Mesa Grande-like", whereas the East Ranch is more a 'hybrid' between Julian or "Volcan Mountain-type" vegetation and "Mesa Grande-type" vegetation.

The preserve was recovering from many years of ranching, which was evident in the plant species composition. Non-native herbaceous species are well-established on the preserve, particularly filaree (*Erodium* spp.), ripgut (*Bromus diandrus*) and wild oat (*Avena* sp.). Non-native tree species, such as tree-of-heaven (*Ailanthus altissima*) are also established on the preserve.

Management recommendations for the preserve range from minimal/no management of the natural resources to active management. Future projects proposed include post-fire monitoring, additional biological inventories, experimental treatments for removal of non-native grasses and other invasive species, hydrological studies, and insect studies.

In October 2003, the Cedar Fire burned from Inaja Rest Area northeast towards Farmer's Road. It is estimated about one-third of the East Ranch was burned. The results and most of the management recommendations herein were compiled prior to those fires.

II. Introduction & Methods

Santa Ysabel Preserve was established in 2001 from a purchase by The Nature Conservancy from the Edwards Family. It totals nearly 5,400 acres and is split into two Ranchs; an "East Ranch" and "West Ranch". The East Ranch is east of the town of Santa Ysabel (and Highway 79 running north) and is bordered on the east by Farmer's Road in Julian (Map 1). The "West" Ranch is west of the town of Santa Ysabel (and Highway 79 running north) and is bordered to the north by Mesa Grande road (Map 1).

The East Ranch is 3,894 acres with an elevation gradient that ranges from 2934 to 4292 feet (894-1308 meters). The West Ranch is 1,512 acres with an elevation gradient from 2720 to 3636 feet (829-1108 meters).

Surveys were conducted mid March 2002 through November 2003. The 2002 field season was devoted nearly entirely to surveying the East Ranch which appeared to have higher diversity than the West Ranch. The 2003 field season was devoted to surveying the West Ranch but periodic visits were still made to the East Ranch due to higher rainfall levels in 2003. Surveys took place once to twice a week throughout the growing season (March-September) and thereafter once every few weeks outside of the growing season .

Survey areas were prioritized based on known characteristics of the site (slope, aspect, soils, geology, associate species, disturbance, etc.) as well as “an indefinable combination of intuition, judgement, preparation, and luck.” (USFS 1991). These potential “hot spots” were botanized most heavily. This type of survey is referred to as the “intuitive-focused”, “limited focus” or “intuitive-controlled” survey technique (USFS 1991; BLM 1996). Areas deemed of secondary importance were botanized as the next priority. GPS (Global Positioning System) coordinates were recorded for every species of interest observed and/or collected, using a portable Garmin ETREX, 12 channel GPS unit. Datum used for the GPS unit was WGS 84 and units were UTM (Universal Transverse Mercator).

Guidelines for plant collecting were based on the 1986 guidelines of the WWF/ Plant Conservation Roundtable, the California Native Plant Society Guidelines (<http://www.cnps.org/rareplants/inventory/guidelines.htm>), and California Department of Fish and Game guidelines (<http://www.dfg.ca.gov/whdab/html/cnddb.html>). In cases where population numbers were sufficient and it was deemed necessary to document a population, vouchers were collected. Necessary collecting permits were obtained from the U.S. Fish and Wildlife Service and California Department of Fish and Game.

The identity of all rare plants or plant “Species of Interest” (^{sl}) were confirmed at Rancho Santa Ana Botanic Garden (RSABG) herbarium. Voucher specimens were submitted to the RSABG and the San Diego Natural History Herbaria.

Aerial photos were provided by The Nature Conservancy for the vegetation map. An acetate overlay was created. Plant communities were photographed and ground truthed and if possible, a GPS coordinate was taken from the center of the community type to facilitate more accurate mapping. If necessary, voucher specimens of dominant species were collected. Plant communities were identified using Modified Holland (MoH; Oberbauer 1996) and the classification system established by the California Natural Diversity Database (CNDDB) Terrestrial Plant Communities program.

CNDDB Rare Plant and/or Plant Community forms will be submitted to the California Department of Fish and Game.

NOTE: In late October, 2003, a catastrophic wildfire burned through the Julian area including about one-third of the East Ranch from Inaja Memorial Park northeast towards Farmer's Road. These results cover the 2002 and 2003 field season prior to the 2003 fire.

III. Results

Soil types that are present on the Preserve are summarized in Appendix 1.

Rainfall over the course of this study was lower than average. The 2002 field season was affected by the continuing severe drought and that likely affected the results of the 2002 plant surveys. The 2003 field season proved to be much more prolific due to a higher amount of rainfall prior to and during the field season. The difference between the two years was quite extreme. Plants in 2002 showed severe water stress in the form of premature dropping of leaves, incomplete flower bud formation or bud drop, severe leaf

droop, no growth after a certain point, and mortality. Very few annuals were observed in 2002. Annuals that were not in the forest understory were virtually non-existent on the ridgetops and within the chaparral.

The East Ranch contains plant species characteristic of higher elevation and montane-type habitats that are absent from the West Ranch. The topography on the East Ranch is more variable and extreme (steep) and closer to the headwaters of Santa Ysabel Creek. Therefore, based on the surveys completed, the plant community and species diversity was higher on the East Ranch than the West Ranch (Figures 1 and 2). The East Ranch is lower in elevation to Volcan Mountain and lacks the dominant coniferous and montane elements of Volcan Mountain. Large areas of montane plant communities as known from Volcan Mountain do not occur on the preserve. Scattered coniferous species are found on the East Ranch but these communities seem more transitional than climax plant communities. The lower elevation range of the West Ranch corresponds with lower floral diversity than on the East Ranch and the flora is more "Mesa Grande-like" than "Julian-like" (Figures 3 and 4). Santa Ysabel creek tends to "flatten out" by the time it gets to the West Ranch as expected at the lower elevations as it flows through the Mesa Grande area into Sutherland Reservoir. Vegetatively, the West Ranch is more "Mesa Grande-like" and the East Ranch is more a 'hybrid' between Julian or "Volcan Mountain-type" vegetation and "Mesa Grande-type" vegetation.

Eighteen confirmed rare plants or plant "Species of Interest" were located during the surveys (Appendix 3): Banner dudleya (*Dudleya saxosa aloides*), bitter gooseberry (*Ribes amarum*), caraway-leaved gilia (*Gilia* (*Saltugilia*) *caruifolia*), Cleveland sage (*Salvia clevelandii*), Descanso (San Diego) milkvetch (*Astragalus oocarpus*), Engelmann Oak (*Quercus engelmannii*), jewelflower (*Caulanthus heterophyllus heterophyllus*), Kern's brodiaea (*Brodiaea terrestris kernensis*), long-spined spineflower (*Chorizanthe polygonoides longispina*), mountain pink currant (*Ribes nevadense*), Palmer's sagewort (*Artemisia palmeri*), Palomar monkeyflower (*Mimulus* (*diffusus*) *palmeri*), prostrate spineflower (*Chorizanthe procumbens*), San Diego gumplant (*Grindelia hirsutula hallii*), San Felipe monardella (*Monardella nana leptosiphon*), western azalea (*Rhododendron occidentale*), Wright's hymenothrix (*Hymenothrix wrightii*), and yellow (velvety) false lupine (*Thermopsis californica semota*).

A. East Ranch

East Ranch Species of Interest include:

| | |
|--------------------------------|------------------------------------------------------|
| Banner Dudleya | <i>Dudleya saxosa aloides</i> |
| Bitter Gooseberry | <i>Ribes amarum</i> |
| Caraway-leaved Gilia | <i>Gilia</i> (<i>Saltugilia</i>) <i>caruifolia</i> |
| Cleveland Sage | <i>Salvia clevelandii</i> |
| Descanso (San Diego) milkvetch | <i>Astragalus oocarpus</i> |
| Engelmann Oak | <i>Quercus engelmannii</i> |
| Jewelflower | <i>Caulanthus heterophyllus heterophyllus</i> |
| Kern's Brodiaea | <i>Brodiaea terrestris kernensis</i> |

| | |
|-------------------------------|--------------------------------------------|
| Long-spined Spineflower | <i>Chorizanthe polygonoides longispina</i> |
| Mountain pink currant | <i>Ribes nevadense</i> |
| Palmer's sagewort | <i>Artemisia palmeri</i> |
| Palomar monkeyflower | <i>Mimulus (diffusus) palmeri</i> |
| San Diego Gumplant | <i>Grindelia hirsutula hallii</i> |
| San Felipe Monardella. | <i>Monardella nana leptosiphon</i> |
| Western Azalea | <i>Rhododendron occidentale</i> |
| Wright's Hymenothrix | <i>Hymenothrix wrightii</i> |
| Yellow (Velvety) False Lupine | <i>Thermopsis californica semota</i> |

East Ranch Plant Communities include:

Forests and Woodlands

Mixed Oak/Coniferous/Bigcone Fir/Coulter Pine

Coniferous Forest Types

Bigcone Douglas Fir (*Pseudotsuga macrocarpa*)

Coulter Pine (*Pinus coulteri*)

Incense Cedar (*Calocedrus decurrens*)

Oak Woodland/Forest Types

Mixed Oak Woodland/Forest

Black Oak (*Quercus kelloggii*) Woodland/Forest

Coast live oak (*Quercus agrifolia*) woodland/forest

Engelmann Oak (*Quercus engelmannii*) woodland/savanna

Golden cup oak (*Quercus chrysolepis*)

Woodland herb-no types

Shrub-dominated Communities

Chamise (*Adenostoma fasciculatum*)

Mixed-Montane Chaparral

Scrub oak (*Quercus berberidifolia*) dominated chaparral

White sage (*Salvia apiana*) dominated chaparral/scrub

Mountain mahogany (*Cercocarpus betuloides*)

Matchweed (*Gutierrezia sarothrae*)

Matchweed-California Buckwheat (*Eriogonum fasciculatum polifolium* and *fasciculatum*)

Matchweed-Wright's Eriogonum (*Eriogonum wrightii membranaceum*)

Matchweed-Three Awn (*Aristida purpurea longiseta*)-Buckwheat

Wetland

Wetland-Riparian herbaceous

Pacific Rush (*Juncus effusus pacificus*)

Pondweed (*Lemna minuscula*)

Sedge Meadow

Mixed Wet Meadow

Kanaka Flats Alluvial Drainages

Seep or "perched wetlands"

Ponds

Riparian

Coast Live Oak Riparian Woodland

White Alder (*Alnus rhombifolia*) forest

Willow scrub

Upland Herbaceous Communities

Native grassland

Junegrass (*Koeleria macrantha*)/One-sided Bluegrass (*Poa secunda secunda*)

Melica (*Melica imperfecta*) grassland
Forms locally dominant stands.

Needlegrass (*Nassella cernua*)

Giant Stipa (*Achnatherum coronatum*)

Deergrass (*Muhlenbergia rigens*)

Blue Wild Rye (*Elymus glaucus glaucus*)

Squirreltail (*Elymus elymoides*)

Native Grassland (Needlegrass)/Wildflower Meadow

Three Awn Grassland (*Aristida purpurea longisetata*)

Non-native grassland

Non-native Grassland/Wildflower Meadow

Ruderal/Non-native grassland

Wildflower Meadow

Ruderal/Agricultural

Disturbed

Exotic Plants

An impressive "Dudleya rock garden" (*Dudleya edulis*) was discovered in 2003 on outcrops that rise above Highway 79 across from the Inaja Memorial Rest Area. Plants were large and vigorous with many flowering in 2003 (Figure 5). Thousands of Dudleyas occurred in this area growing on and within the fissures and cracks of the granitic outcrops. This area appeared to be burned in the 2003 Cedar Fire. At this time, it is not known how or if the "Dudleya garden" will recover.

In 2003, three genera (*Phacelia*, *Eriogonum*, and *Amsinckia*) were observed with exhibiting unusual growth form of the stems. The stems appeared greatly flattened and thickened. A *Phacelia ramosissima* collected from the "Dudleya rock gardens" area had a stem that was a centimeter thick and seven centimeters wide. The cause of this growth form is not known but a specimen was taken each time one of these plants was observed.

Two new plants species of interest were found on the East Ranch in 2003: dwarf brodiaea (*Brodiaea terrestris kernensis*) (Figure 6) and long-spined spineflower (*Chorizanthe polygonoides longispina*). Neither of these two species were evident in the 2002 field season. There were very few of the long-spined spineflower observed. The bulb plants were more prominent in 2003 than in 2002.

Three western azaleas were located on the East Ranch all along Santa Ysabel Creek (Figure 7). At one location, one western azalea and a population of creek dogwood (*Cornus sericea occidentalis*) occurred within close proximity of one another. Both species are known from moist forest types (Jepson 1996; Munz 1974; McMinn 1974). Western azalea is on the southern edge of its range in San Diego County (Jepson 1996; Munz 1974; McMinn 1974).

As of mid-October, the largest of the three azaleas was affected by a downy mildew-like fungal growth that seemed to be contributing to defoliation of the plant. Rhododendron can take-on an evergreen or deciduous habit so it was hoped the timing of the leaf loss in fall would not prove detrimental to the plant. Of the three azaleas, only one flowered

and this was the one exhibiting the fungal infection. The fungal infection appeared to affect the reproductive success. Capsules were covered with the fungal growth and this appeared to inhibit their development. Of an estimated 400 flowers counted, only 5 capsules appeared to be developing normally (enlarging and not shriveled or dropping off). This plant was also observed developing another set of flower buds, on November 3, 2002. The second blooming cycle may have been a response to the fungal infection and/or due to the late rains.

Members of the Ericaceae including *Rhododendron*, act as host species for the fungus that causes Sudden Oak Death Syndrome (*Phytophthora ramorum*). In an article recently published in *Fremontia* (Swain 2002), it states that most *Rhododendron* species acting as hosts for the fungus in California are "most often not native to California" but are from the horticultural trade.

The Cuyamaca-Laguna Mountains have assemblages of plants in canyon "refugia" that are more typical of a Sierra Nevadan flora. (Of these species, those that occur on the preserve are superscripted with "SY"). These species and genera include: California bay (*Umbellularia californica*), big-leaf maple (*Acer macrophyllum*), western azalea^{SY} (*Rhododendron occidentale*), dogwood^{SY} (*Cornus* spp.), Utah serviceberry^{SY} (*Amelanchier utahensis*), and barberry^{SY} (*Berberis* spp., formerly *Mahonia*). Of these "refugia" species, big-leaf maple, rhododendron^{SY}, and California laurel act as hosts for *Phytophthora ramorum*.

Other plants that are currently known to act as hosts for *Phytophthora ramorum* that have generic* or species-specific** representation on the preserve and/or in the Cuyamaca-Laguna Mountain region include: manzanita*^{SY} (*Arctostaphylos*), toyon**^{SY} (*Heteromeles arbutifolia*), honeysuckle*^{SY} (*Lonicera*), Douglas fir*^{SY} (*Pseudotsuga*), coast live**^{SY} and black oak**^{SY} (*Quercus agrifolia* and *kelloggii*, respectively), and coffeeberry*^{SY} (*Rhamnus*). A total of four genera and four species that occur on the preserve are known to act as hosts for *Phytophthora ramorum*.

Although *Phytophthora ramorum* has not been confirmed in San Diego County (Swain 2002), the presence of *Phytophthora* fungi has been confirmed on San Diego oaks (pers. comm., Matteo Garbelotto, Iron Mountain Conservancy oak workshop, May 2001).

B. West Ranch

West Ranch Species of Interest include:

| | |
|--------------------------------|-----------------------------------------------|
| Banner Dudleya | <i>Dudleya saxosa aloides</i> |
| Cleveland Sage | <i>Salvia clevelandii</i> |
| Descanso (San Diego) milkvetch | <i>Astragalus oocarpus</i> |
| Engelmann Oak | <i>Quercus engelmannii</i> |
| Jewelflower | <i>Caulanthus heterophyllus heterophyllus</i> |
| Prostrate Spineflower | <i>Chorizanthe procumbens</i> |

West Ranch Plant Communities include:

Forest and Woodlands

Coast live oak (*Quercus agrifolia*) woodland/forest

Engelmann Oak (*Quercus engelmannii*) woodland/savanna

Woodland herb-no types

Shrub-dominated Communities

Chamise (*Adenostoma fasciculatum*)

Mixed-Montane Chaparral

Scrub oak (*Quercus berberidifolia*) dominated chaparral

White sage (*Salvia apiana*) dominated chaparral/scrub

Mountain mahogany (*Cercocarpus betuloides*)

Inland Sage Scrub Component

California Sagebrush (*Artemisia californica*)

Matchweed (*Gutierrezia sarothrae*)

Matchweed-California Buckwheat (*Eriogonum fasciculatum polifolium*,
fasciculatum)

Wetland

Wetland-Riparian herbaceous

Pacific Rush (*Juncus effusus pacificus*)

Pondweed (*Lemna minuscula*)

Sedge Meadow

Mixed Wet Meadow

Ponds

Riparian

Coast Live Oak Riparian Woodland

Willow scrub

Upland Herbaceous Communities

Native grassland

Melica (*Melica imperfecta*) grassland

Needlegrass (*Nassella cernua*)

Giant Stipa (*Achnatherum coronatum*)

Deergrass (*Muhlenbergia rigens*)

Blue Wild Rye (*Elymus glaucus glaucus*)

Squirreltail (*Elymus elymoides*)

Native Grassland (Needlegrass)/Wildflower Meadow

Non-native grassland

Non-native Grassland/Wildflower Meadow

Ruderal/Non-native grassland

Wildflower Meadow

Ruderal/Agricultural

Disturbed

Exotic Plants

When the Descanso milkvetch population was found on the West Ranch in 2003, about 75% of it appeared to be dead, quite likely from the 2002 severe drought. A recheck later in the field season confirmed this. New plants were found in the vicinity of the dead plants.

C. Santa Ysabel Ranch Sensitive Resources

Sensitive resources, in addition to *Plant Species of Interest*, include:

Santa Ysabel Creek and floodplain, and associated riparian habitat and wetlands, including all tributaries (Figures 18 and 19)

"Perched wetlands" associated with seeps, occurring on upper slopes of the preserve

"Pocket wetlands" or isolated wetlands that did not appear to be associated with any above-ground (i.e. visible) water source

Kanaka Flats wetlands

All drainages and seeps on the preserve, some of which occur in the outcrops at the higher elevations. (Figure 8)

Native grasslands. Nodding needlegrass (*Nassella cernua*) and three-awn (*Aristida purpurea longiseta*) grasslands/meadows occurred frequently on the preserve, most often as patches or locally dominant stands (Figure 13). Plant Species of Interest were found associated with these community types, such as Wright's Hymenothrix (Figure 10), San Diego gumplant (Figures 15 and 16), and/or dwarf brodiaea (Figure 6). The three-awn-Hymenothrix association is unique for the area (Figures 9 and 10). The herbaceous component of the preserve is quite complex. Native grasslands often co-occur with non-native annual grasses and native/non-native wildflowers (herbs). Other native grasses occur on the preserve as well. It is possible that the total removal of cattle has allowed the non-native grasses and other weedy species to "release" and thrive. This can adversely affect native plant species on the preserve (McPherson 1997). Much acreage on both ranches is covered by non-native ripgut grass (*Bromus diandrus*). This has management implications and is discussed in the Management Recommendation section and in Appendix 6.

Oak woodland and savanna

Old growth. Many old growth coast live oak (*Quercus agrifolia*), sycamore (*Platanus racemosa*) and even Engelmann oak (*Quercus engelmannii*) trees were observed, some which may be the oldest trees in the county (Figures 11 and 12).

V. Discussion

The East Ranch had higher plant community and plant species diversity, as well as more Species of Interest, than the West Ranch.

The highest elevation on the East Ranch is 4,292 feet (1308 meters). If one uses Volcan Mountain (Simmon's Flat) to the east and the location of the Volcan Mountain Preserve as a comparison, the elevation of this area ranges from 3100 (945 m) to 5353 feet (1631 m). Plant communities associated with the higher elevation "montane" habitats known from Volcan Mountain (Sproul 2001) are missing from the East (and West) Ranch(s) of the preserve. These include: bigcone Douglas fir/canyon oak (*Quercus chrysolepis*) forest, canyon live oak forest, Coulter pine (*Pinus coulteri*) forest and Sierran mixed coniferous forest (*Pinus coulteri*, *Pseudotsuga macrocarpa*, Incense Cedar (*Calocedrus decurrens*), and white fir (*Abies concolor*). Though all but one of these species occur on the East Ranch, populations are scattered and these communities seem more transitional than climax plant communities. No white fir was found on the East (or West) Ranch. Vegetatively, the West Ranch is more "Mesa Grande-like" (which makes sense because it is in the Mesa Grande area) and the East Ranch is more a 'hybrid' between Julian or "Volcan Mountain- type" vegetation and "Mesa Grande-type" vegetation.

Generally the presence of montane mid to high elevation plant communities indicates greater precipitation most often from the presence of a rain shadow effect whereby a major air mass hitting a mountain range then cools, condensation occurs, and precipitation falls on the windward (usually western) side of the range. The descending dry air then creates a pronounced desert effect on the eastern slopes of the range (Vankat 1979, Barbour et. al. 1987). Most rare plants in the Cuyamaca/Laguna are found at the higher elevations (4,000-6,500 feet or 1219-1981m; Hirshberg and Clemons 1996). The lack of a dominant or subdominant montane element, lower

precipitation coupled with decades of grazing may be a factor in the potential of occurrence for some rare plants on the Santa Ysabel Preserve.

Native grassland was extensive in some areas on the preserve and included dominant stands of nodding needlegrass (*Nassella cernua*), junegrass (*Coeleria macrantha*) co-occurring with one-sided bluegrass (*Poa secunda secunda*) and a unique though limited plant community of three-awn (*Aristida purpurea longiseta*) co-occurring with the rare plant, Wright's Hymenothrix (*Hymenothrix wrightii*) (Figures 9, 10 and 13). The likelihood of significant stands of native grasslands was expected to be low due to the cattle grazing; however, some stands of native grasses were found where the slopes are steep. Often these slopes have little or no soil layer (exposed bedrock). The ability of these native grass species to grow in these sites may give them a competitive advantage over the non-native aggressive grasses which are predominant on the preserve.

The severe drought no doubt affected the results of the 2002 surveys. Signs of drought stress were common and ranged from premature leaf drop (as observed in coast live oak (*Quercus agrifolia*), manzanita (*Arctostaphylos* spp.), black oak (*Quercus kelloggii*), scrub oak (*Quercus berberidifolia*), and elderberry (*Sambucus mexicana*)), to incomplete flower bud development, flower bud atrophy or drop, or no flower production at all. Some plants appeared to be dying. In many species, dormancy may be induced by severe drought (Harper 1983). Flower buds were observed incompletely developed, shriveled or would drop off at the slightest touch. Species observed with incomplete flowering and flower bud production included snowberry (*Symphoricarpos mollis*), velvety false lupine, and mountain pink currant (*Ribes nevadense*). The Wright's Hymenothrix showed severely stunted growth and produced only a few plants that flowered in 2002 in contrast to 2003 when hundreds of plants flowered.

For plant species that have an asexual reproductive alternative (sprouting from the root system or stolons), the drought may not be as dire a situation as for those species that can only reproduce through flowering (i.e. sexually). Implications of this are reduced fitness and reliance on the existing seed bank for recruitment (if there is one). Drought-stressed plants are also subject to stress from other factors such as disease and insects (Barbour et al. 1999). Mountain pink currant shrubs showed severe insect damage in the form of leaf defoliation. A feedback mechanism may exist between the insect and defoliation. The timing of the defoliation is critical in determining the plant's response (Harper 1983). If the leaves are removed after the inflorescence has been formed, the effect is generally to increase seed abortion or the plant may produce smaller seeds (Harper 1983). Some of these mechanisms and responses were evident in plants observed on the preserve during the 2002 field season.

Plant Communities on the Preserve

The Santa Ysabel Ranch Open Space Preserve contains a rich mosaic of plant communities (Appendix 5). The distribution of plant communities is affected by many past and present factors including but not limited to agricultural uses, cattle grazing, fire, wildlife, human activity such as selective tree removal and road building. The most influential effect on plant distribution in the future may likely be global warming and any subsequent climate change. The characteristics of the plant communities on the preserve should be viewed as the sum of all these factors.

Non-native ripgut grass (*Bromus diandrus*) occurs prolifically on the Preserve. Santa Ysabel Preserve (the Edwards Ranch) had been used for ranching for many years and as of 2001, most of the cattle were removed. The removal of cattle may encourage the spread of non-native grasses and weeds. Most likely, the cattle kept the ripgut (*Bromus diandrus*) in control because they will eat the new sprouts (*pers. observation*); the control of this and other noxious grass may have benefited other native plant species (McPherson 1997). It is not known if deer or other herbivores forage on the ripgut and wild oat sprouts, and, if they do, to what extent this foraging affects survival of the non-native grasses. Removing cattle from a place where they have been for many years has implications for management (see Appendix 6).

East Ranch

Based on the surveys completed, in general, the most predominant plant community types on the East Ranch appeared to be: coast live oak woodland, Engelmann oak (*Quercus engelmannii*) woodland, oak and white alder riparian woodland, ripgut (*Bromus diandrus*) non-native grassland, non-native grassland/meadow, scrub oak chaparral, and chamise chaparral. On the East Ranch, in general, the coast live oak forest was restricted to the lower slopes and valley area while the black oak and canyon live oak occurred higher on the ridge slopes and ridge tops. Ridgetops were often rimmed with chaparral with big cone Douglas fir (*Pseudotsuga macrocarpa*) and Coulter pine (*Pinus coulteri*) stands near the ridgetops. Once cresting the ridge, it opens to the south into non-native grassland/wildflower meadows with scattered occurrences of native grasses and associated herbs. Colonies or locally dominant "rings" of wild rose (*Rosa californica*), squawbush (*Rhus trilobata*), and snowberry occurred in the open grassy areas.

No large dominant stands of conifers were observed on the preserve. All appear to form relatively small isolated stands (generally less than a few acres) or they may be scattered and intergraded within the oak woodland or grassland community types. Many of the oak and sycamore trees are quite old and impressive. Old-growth species include sycamore (*Platanus racemosa*), coast live oak (*Quercus agrifolia*) as well as some old-growth Engelmann oak (*Quercus engelmannii*). An inventory of the old growth, including regeneration, is highly recommended.

The elevational gradient of the various woodland and forest types can be obvious. Generally, one can walk from the coast live oak forest on the lower slopes, into a black oak forest mid-slope, then into a canyon live oak area near the top of the slope and into Coulter pine at the top of the ridge. This type of distribution is fascinating and gives credence to the hypothesis that the Santa Ysabel Preserve comprises a transitional zone in plant communities from the montane, as on Volcan Mountain, to those more resembling lower elevation plant communities, such as Mesa Grande. The East Ranch of the preserve indeed seems to be a "textbook example" of a transitional zone between montane elements and the Mesa Grande "foothills" area which is similar in elevation.

Surveys included an area that had been burned in the past (pre-Cedar and Pines Fire) and the signs were still existent. Species observed in this area included manzanita: (*Arctostaphylos pungens*), coast live oak seedlings and saplings, snowberry, honeysuckle (*Lonicera subspicata*), saw-tooth goldenbush (*Hazardia squarrosa* g.), white sage (*Salvia apiana*), Coulter pine, blue wild rye (*Elymus glaucus glaucus*), june grass (*Koeleria macrantha*), one-sided blue grass (*Poa secunda* s.), narrow-leaf

bedstraw (*Galium angustifolium angustifolium*), checker mallow (*Sidalcea malvaeflora sparsifolia*) and poison oak (*Toxicodendron diversilobum*). Young bigcone Douglas fir trees about 10-18 inches (20-45 cm) in diameter at breast height were also observed in this area.

One of the more predominant features of both ranches is the extensive Engelmann oak savanna (Figure 4). Oak savannas are being displaced by urban growth on a large scale (McPherson 1997). Urbanization has been the major contributor to a recent rapid decrease in the extent of California oak savannas (McPherson 1997). The rate of regeneration of this community type was not assessed during these surveys (beyond anecdotal observations) but a study of this type is strongly recommended and is addressed under the "Possible Future Projects" section of this report.

Two massive wildfires occurred during the course of this study. In August 2002, the 63,000 acre Pines Fire burned much of the neighboring Volcan Mountain ridge system. In October 2003, the Cedar Fire burned over 270,000 acres, in addition to approximately one-third of the East Ranch from Inaja Memorial Park northeast towards Farmer Road in Julian. The effects of this remain to be determined, but the fire in combination with the drought and climate change, may alter vegetation patterns permanently (i.e. type conversion). Fires have been recorded on the East Ranch in 1940, 1947 and 1963 (California Department of Forestry and Fire Protection, Fire Perimeter Data, 2002). Fires occurred on the West Ranch in 1929, 1938, 1956, and 1981.

Approximately 3 miles (~5 km) of the Santa Ysabel Creek corridor occurs on the East Ranch. Waypoint 107 from the East Ranch marks a place where an underground channel meets Santa Ysabel Creek. This is most likely a fracture that is draining into the creek. The Division of Mines report for the Santa Ysabel quadrangle states,

"Santa Ysabel Creek is apparently an exception to the rule of structural control. Although a short section of one branch follows the Elsinore fault, and the west end follows a contact, the creek meanders across the Elsinore fault and other prominent structures. It is one of the largest through-going streams and probably was able to maintain its course regardless of faulting." pp. 19

At times in 2002, the creek on the East Ranch was nearly dry aside from isolated (sometimes eutrophic) pools. White alder forests occur on the East Ranch (Figure 14). Stands of dead white alder (*Alnus rhombifolia*) were evident along the west end of the creek. The root system of alder is shallow; it "likes to keep its feet wet" and does not tolerate drying out (Harlow et. al. 1978). It is a prolific seeder but only if there is plenty of moisture (Harlow et. al. 1978). It also has an actinorhizal relationship which enables it to fix nitrogen, thereby building the soil. Nitrogen-fixing plants are capable of increasing soil nitrogen levels by more than ten times (Vankat 1979). Mortality of alder stands on the creek may continue thus removing from the riparian area a significant forest element. It is not clear at this time whether the low flows were due to natural (e.g., drought conditions) or anthropogenic causes, or a combination of the two. The Julian Water District draws from the Santa Ysabel watershed, cattle have used it for the last ~ 50 years, and the reservation may be drawing from tributaries or the creek itself (a large cement dam exists on the creek where it meanders onto the reservation; Waypoint 112).

West Ranch

The most common plant community types on the West Ranch were coast live oak (*Quercus agrifolia*) woodland/forest, Engelmann Oak (*Quercus engelmannii*) woodland/savanna, chamise (*Adenostoma fasciculatum*), mixed-montane, scrub oak (*Quercus berberidifolia*) dominated chaparral, white sage (*Salvia apiana*) dominated chaparral/scrub, inland sage scrub component with California sagebrush (*Artemisia californica*), mixed wet meadow, willow scrub non-native grassland/wildflower meadow, ruderal/non-native grassland and ruderal/agricultural. No conifers were found on the West Ranch and no montane plant communities were identified as occurring on the West Ranch.

The West Ranch is in Mesa Grande and extends north from Highway 78 to Mesa Grande Road. The vegetation on the West Ranch is typical of the Mesa Grande area--generally an oak savanna type habitat with an herbaceous understory (mostly non-native grasses and mixed herbs). The dominant oak species in this case is Engelmann oak (*Quercus engelmannii* and probably hybrids) and coast live oak (*Quercus agrifolia*). The Engelmann oak savanna on the West Ranch is extensive and the dominant plant community on the West Ranch. (Figure 4).

Only about a half mile or less (or about .5 km) of Santa Ysabel Creek runs through the West Ranch but this has habitats typical of the creek including oak riparian woodland, willow scrub and wet meadow habitats. The grade down to the creek from the south is extremely steep. Populations of the arroyo toad were discovered along this stretch of the creek by USGS. Arroyo toads are known from Witch Creek which is a tributary of Santa Ysabel Creek that occurs west and south of the West Ranch.

IV. Conclusion

Even though the Santa Ysabel Ranch Open Space Preserve comprises one name, the "preserve" is actually two distinct units or "ranches". Each "ranch" is ecologically distinctive. The East Ranch had a higher plant species and plant community diversity including montane elements found on nearby Volcan Mountain, while the West Ranch is more an open oak savanna-type area. Each plays a role in protecting the Santa Ysabel Creek watershed. The differences between these two parcels increase their overall value for preserving biodiversity of local, regional and national significance.

The Santa Ysabel Ranch Open Space Preserve must be one of the finest examples of local and regional biodiversity in San Diego County. Though the plant species composition was affected by years of cattle grazing, the ranch remains in excellent "biological condition". The ranch-turned-preserve has tremendous diversity of habitats and provides a land area contiguous and large enough to support viable populations of wildlife. The preserve is in the process of rebounding from years of cattle grazing and human use. Ranchers call this "resting" an area – an important ecological process that can extend over years as the land establishes a new "homeostasis" in the absence of persistent and long-term disturbance. This "resting period" may help the area better withstand future impacts as an open space reserve.

The preserve is also a functioning system as a whole. Pronouncing one part more important than another part is akin to deciding the alternator is the most important part of a car when this "most important part" is totally useless without the rest of the system. In

light of this, all the elements of the preserve should be protected and managed very carefully and respectfully to maintain the workings of the whole (eco)system.

The Santa Ysabel Preserve is an outstanding example and remnant of San Diego County's, often fragile, biodiversity. Management actions should prioritize habitat conservation goals. Only public uses compatible with those conservation goals should be considered for secondary "uses" of the Preserve.

VI. Management Recommendations

Management prescriptions of the Preserve should be consistent with the maintenance of long-term viability of its native species and communities. Threats to plant resources include physical disturbance (e.g., trampling), invasion by non-native species (including plants, invertebrates, and pathogens), forest and fire management prescriptions, altered fire regime, and unmanaged or incompatible recreation.

Management of the Ecological Mosaic

In general, only non-motorized and non-hoofed recreation (e.g., hiking, nature study, birding, etc.) is recommended for the whole preserve. Horseback riding and mountain biking is not recommended on the preserve, as these uses are frequently associated with difficult-to-regulate off-trail use, and unauthorized trail formation, which can imperil sensitive resources.

Overall, the West Ranch appears to be better suited for human visitation and recreation than the East Ranch. The East Ranch has a greater overall diversity of habitats and plant communities, has the greatest number of rare plants discovered thus far, is of a greater topographic relief which includes a montane element to the flora, has the creek running through the total area, and exhibits a greater fragility than the West Ranch. The East Ranch comprises a transition zone between the flora and characteristics of Mesa Grande and Volcan Mountain. Therefore it has a greater overall diversity. There are areas that are permanently or temporarily particularly delicate (e.g., areas of some slopes with unstable soils, the entire area affected by the Cedar Fire); recreational access in those areas should be restricted.

Elevational gradients do not vary as much on the West Ranch and it is indeed part of the total Mesa Grande region which is more savanna/grassland-like and has very few montane elements. The area has also been used for agricultural uses extensively and, based on the dominant plant species composition, is more disturbed than the East Ranch. Non-native grassland, composed primarily of ripgut (*Bromus diandrus*) and wild oat (*Avena barbata*) dominate the West Ranch herbaceous element, in some areas, forming vast monotypic stands. Engelmann oak is the dominant tree species on the West Ranch but if the existing road system is used for access, impacts to this species should remain low.

Management of Plant Species of Interest

At present, 18 plant "Species of Interest" are known on the preserve, 12 that are known only from the East Ranch, one only known from the West Ranch (though likely on the

East Ranch) and five that occur on both parcels. Plants that may be adversely affected by human activities include

- Banner Dudleya: occurs along the Santa Ysabel Creek on the East Ranch
- Descanso milkvetch: occurs in and along the main access roads on the East Ranch
- Kern's Brodiaea: occurs right next to main access road from Farmer's Road and just above the creek on the East Ranch (Figure 6)
- Long-spined Spineflower: occurs in main access road at one of the exposed Julian schist sites on the East Ranch; very few plants
- San Diego Gumplant: although ubiquitous on the preserve, it does like to grow in disturbed areas including old dirt roads. Common in many of the dirt roads on the preserve (East and West) (Figures 15 and 16)
- Western Azalea: at present, only three shrubs have been located and in 2002, two had been severely grazed (by cattle, deer?). These plants could easily be eliminated. They all grow on the creek on the East Ranch. (Figure 7)

Regarding other resources, an impressive "Dudleya rock garden" (*Dudleya edulis*) was discovered in 2003 on outcrops that rise above Highway 79 across from the Inaja Memorial Rest Area. Plants were large and vigorous with many flowers in 2003 (Figure 5). Thousands of Dudleyas occurred in this area growing on and within the fissures and cracks of the granitic outcrops. This area appeared to be burned in the 2003 Cedar Fire. At this time, it is not known how or if the "Dudleya garden" will recover. These plants may be particularly sensitive to unauthorized rock climbing/bouldering or collecting. Periodic monitoring of these populations should take place to gauge if impacts are occurring to take appropriate protective measures. Priority for monitoring could be those plant species most likely to be subject to human impacts.

The remaining plants all occur in areas quite remote from the main roads and it is unlikely they will suffer adverse effects from human visitors. Rare plant surveys and monitoring of rare plant populations should be continued on the preserve.

Santa Ysabel Creek Protection

The Santa Ysabel Creek attracts human visitors. The whole riparian area is fragile. Bank stability in some areas is low, mostly likely affected by years of cattle use (Figure 17). Targeting humans to a specific area along the creek may be prudent. If the West Ranch is opened, the stretch of creek on this Ranch is shorter than on the East Ranch, which could mean more damage to this stretch of the creek by concentrating the use. In favor of the creek on the West Ranch are the large granite outcrops that occur in the creek on the West Ranch. It is likely visitors will station themselves on these boulders thereby reducing impacts to the wetlands that occur on the banks.

One area on the East Ranch already visited is a naturally eroded "tub", perfect for sitting in. Although some scattered litter was found near this area, the natural construction of the "tub" is out of granite therefore it handles the use impact relatively well. Aside from the litter, I did not observe any serious impacts from this activity but once the reserve is opened to the public, impacts will surely increase. The "tub" location should not be advertised.

Some measures to reduce impacts to the creek and the associated wetlands might include the installation of attractive but unobtrusive foot bridges for creek crossings and/or even elevated wooden walkways to prevent impacts to the wetlands along the creek. The County might also identify "sacrifice zones" that can be rotated over the years and direct the public to these specific areas in order for them to make contact with the creek. These areas should be monitored regularly. Public should be directed to areas that are not surrounded by wetlands, that ideally have exposed bedrock, and can accommodate human visitation/impacts over long periods of time. Selecting 4-5 areas that can be used on a rotational basis may prevent permanent impacts to the creek.

Wetlands Protection

Currently, the main access road from the Farmer's Road entrance bisects a beautiful mosaic of wetlands associated with the creek (Figures 18 and 19). The main ranch roads also bisect the wetlands in the Kanaka Flats. Permanent impacts to this area are highly likely as use increases. Regarding the ranch road from Farmer's Road, options are to relocate this road to the upper slopes, however; the upper southwest-facing slopes north of the creek on the east portion of the East Ranch is where the unique three-awn-Hymenothrix plant community occurs with other Plant Species of Interest. These slopes are also where the perched wetlands occur and where tributaries flow or drain into the creek. The location of this new access road, if built, must be selected very carefully. If drainage patterns are affected, this could also threaten the integrity of the wetlands below the new road. There are areas that are dominated by monotypic stands of ripgut and placing a road within these areas could possibly benefit the surrounding communities if the population of this species is substantially decreased. Again, this decision must be made looking at all the possible environmental effects, including changes in the hydrology. Alternatively, the County could enter into agreement with the Bureau of Indian Affairs to use the road that parallels the Preserve just to the north of the fenceline. This road is not in close proximity to the creek (which would necessitate some walking on the part of the Ranger staff), but it is possibly the cheapest and most environmentally sensible solution. Other than relocating the roads, less invasive options might include the installation of elevated ramps or some type of platforms in those areas with roads that bisect wetlands.

Trash Management

Policy should be to pack it in and pack it out. Trash containers within the preserve could attract wildlife. If trash containers are placed on the preserve, they should be placed in inconspicuous locations to minimize illegal garbage dumping. Unobtrusive bear-proof (wildlife-proof) models are recommended.

Trails Management

The preserve currently has an outstanding and extensive network of ranch roads that can act as trails for visitors. It seems unlikely that new trails would need to be constructed. Maintaining these roads over time should be non-invasive. "Industrial-scale" grading and road widening is not recommended, as that can cause a loss of native habitat, encourage the growth of non-natives weeds, and if berms are created, this can channel the water into the newly graded roads, thereby causing gully erosion and necessitating further grading. It is important to realize that anywhere where the soil is disturbed, cleared, graded, ripped, weeds will appear thereby possibly creating new

management problems. Observed road maintenance by the County on the East Ranch appeared to be effective yet unobtrusive. The areas were weed whipped or mowed but the width of the road was not increased.

Forest Management

A number of conifers on the East Ranch have been killed (Figure 20) by the western bark beetle (*Dendroctonus brevicornis*). Dead trees should be left if not a fire hazard to adjacent landowners, or risk to the safety of visitors engaged in authorized activities. These trees are important to many wildlife and bird species. Some diseased trees may survive this infestation, and therefore be important for the recovery of these populations and communities. Indeed, some may be important for the development of stronger or resistant strains to the beetle and associated fungus. As is evident in the Julian area, some Coulter pines are surviving this attack and these trees should be retained.

Oak Management

Oak woodlands support a whole oak-dependent ecosystem. Numerous animal species depend on oak trees for their survival (recommended: *Oaks of California*, by Bruce Pavlik, Pamela Muick, Sharon Johnson, and Marjorie Popper. Cachuma Press and the California Oak Foundation). The oaks (and sycamores as well as other species) comprise some of the largest (per d.b.h.) trees ever observed by the surveyor. These trees in and of themselves are valuable for protection. As stated in the "Oak Woodland Bird Conservation Plan" produced by the California Partners in Flight Program (2002),

"Protecting sites with a diverse age structure of oak trees will provide a continuum of seeding phenologies, preventing synchronous or wide-scale acorn crop failures (or local extirpation of oak woodlands). Maintaining large old oaks within a diverse age structure will provide decaying limbs necessary for bird nesting sites in addition to high output acorn production. McDonald (1990) demonstrated that Black Oaks (*Quercus kelloggii*) must reach 30 years before producing viable acorns and seldom produce large quantities of acorns until they reach 80-100 years. Good acorn producing trees can continue abundant production up to 200 years."

Visitors to the Preserve may transmit spores of *Phytophthora ramorum* onto the preserve via their shoes, mountain bike tires and possibly in horse hooves. Whether or not the spores germinate and the fungus spreads may ultimately be determined by climatic factors (Swain 2002). At any rate, the possibility of transmitting the SODS fungus onto the preserve cannot be overlooked.

Removal of Non-native Species

Introduced plants and exotic plants should be removed as soon as possible. High priorities would be removal of tamarisk (*Tamarix* sp.) and tree-of-heaven (*Ailanthus altissima*), both growing in and along Santa Ysabel Creek. One of the predominant plant communities on the preserve is extensive stands of ripgut (*Bromus diandrus*). The brome is capable of taking over areas where native species occur. It is aggressive. Filaree (*Erodium botrys* and *E. cicutarium*) is ubiquitous on the preserve also and it also has affected the occurrence of native plant species (Figure 21).. It is not known if removing the cattle from the preserve has allowed these species to spread even more

but this is highly probable (McPherson 1997). Strategies should be developed regarding managing these species (Appendix).

Tree-of heaven (*Ailanthus altissima*), from China, occurs in the Santa Ysabel Creek on the East Ranch. Though it is a weed tree, it has a fascinating history dating back to the Chinese miners that came to the United States and brought the seeds with them. *Ailanthus* "does it all" which makes it quite challenging to eliminate from a natural area. It tolerates growing in the shade, root sprouts prolifically, seeds itself, and the seeds are moved around by birds and other wildlife. It is also allelopathic (produces chemicals that prevent the growth of other plants). It is commonly seen as a ring of giant clones taking over an area (like a fungus).

Tamarisk is currently rare on the Preserve; only a few plants were observed on the East and West Ranch all along Santa Ysabel Creek. Owing to how small the populations are at this time, the County should attempt to remove these plants as soon as possible. The fact that there are only a few plants (and the ones observed on the West Ranch were small) means the County could eliminate this threat/problem soon.

Large areas of non-native grasses -- the most insidious and prolific of which is ripgut (*Bromus diandrus*) -- occur on the preserve. As a supplement to this topic, I have selected an array of scientific papers that illustrate many of the issues related to accepting, managing or attempting to eliminate invasive non-native grasses (Appendix). There are no easy answers and where large amounts of acreage are already covered with these grasses, one has to weigh if attempting to eliminate these grasses is even possible (see Heady's summary in the papers) and a reasonable use of public funds.

Arguments for calling these invasive plants "naturalized" and living with them are:

- paleobotanically, these invasions may be insignificant.
- these grasses have been here for 100 years or longer. It is unlikely they will ever be completely eliminated short of an adverse (for them) catastrophic change in growing conditions.
- unless areas surrounding an "exotics elimination zone" are also managed, seed invariably spreads back into the area and the area is reinvaded. Ripgut is ubiquitous in the Julian/Cuyamaca area along with other invasive grasses that are thriving.
- attempting to eliminate these grasses is cost-intensive (it is not something that can be done with an extra \$1000 grant funding, one year and a college student). These projects can be extremely demanding--demanding of funding, personnel, and time and the successfulness of these projects depends on *long term* (at least five years if not ten) commitment which in light of personnel turnover and budget crises, is not always possible.
- areas where non-native plants occur can act as "sacrifice zones" as far as where to direct public uses. Putting a picnic table into a monotypic stand of ripgut (that has been cut so it cannot set seed and attack the socks of unsuspecting visitors) can be an effective way to keep these species under control. The key is making sure there are no seeds that can transport to other areas, thus the importance of weed removal and/or mowing prior to seed set.

*Arguments for elimination of non-native invasive species, including not only ripgut but also Filaree (*Erodium* spp.)*

- The primary argument for spending funds on eliminating non-native invasive species is that it may enhance and restore local biodiversity by eliminating noxious species that can outcompete native plant species. Non-native annual grasses can outcompete young oak tree seedlings and choke out many other native species. A decline in native plant species diversity can have a domino effect and may result in a decline of other native taxa.

Techniques used for reducing or eliminating non-native grasses/forbs include:

- controlled grazing keeping in mind that the type of grazer can affect outcome
- prescribed burning (not politically acceptable most likely)
- mowing
- disking/grading (this can also encourage weeds other than the "target" weed(s) and adversely affect non-target species. In the "target weed(s)", disking should occur to prevent flowering and/or seed set).
- solarizing (waiting until the seedlings sprout then basically "cooking" them using various coverings including black plastic, canvas, tarps, etc.)
- herbicides
- a combination of these.

There is no one way, technique, method, etc. to do this. One must review the literature then ideally, set up test plots that experientially test the successfulness of each method. As mentioned before, each one of these techniques, including setting up the experimental plots means money, staff, and time. If one of the methods is found to be successful and is implemented, then it must be for the long-term (including monitoring).

Each method has its own regulatory burden. Herbicides require paperwork, approvals, certification to apply, the right weather conditions, etc. Prescribed burns can be a whole other 'challenge' of regulation including CEQA, smoke plans, contacts with nearby residents, etc. Decisions regarding which management method to use often include much paperwork and regulation. This cost should be factored into overall management approach.

Restoration and Revegetation

If a decision is made to seed in an area, seed should be collected from on or near the site to be revegetated. It can be freely broadcast into the area, with proper site preparation, or grown then planted into the area. Absolutely no "Meadow in a Can" or similar products should be used on the Ranch. When a land area is preserved, so is the gene pool or genetic history/integrity of the area. Introducing outside seed sources or genetic variants can threaten the natural integrity of the existing gene pool. Do not seed in "generic" seeds purchased from Home Depot or any other similar vendor. Similarly, do not seed in native species that do not occur on the preserve naturally.

Select the least invasive method (and often the cheapest) and accentuate natural processes. After a disturbance, unless severe erosion is likely, the area should be enabled to revegetate totally on its own. Chemical free excelsior matting can be placed on the site to stabilize the soils, but the site should be "allowed" to rebound on its own

and observed. Compacted sterile soils can be scarified. If mostly weeds and non-natives pop up, then some type of native seeding or planting may be necessary.

Boundary Issues

The property is shared by various landowners, including the Bureau of Indian Affairs. It is prudent to develop a good working relationship with the adjacent landowners in the interest of protection and proper management of the preserve. Regarding this issue, in August 2003, I found a golden eagle that was nearly dead. It was discovered a few days later and had died. (Figure 22). It possibly died of secondary poisoning from rodent poison (Dave Bittner, *pers. comm.*). The bird may have picked up the poison off the preserve but then foraged on the preserve. This "off the preserve" issue could have serious effects on management of the preserve. Education and positive relationships with adjacent landowners can be an important strategy to good resource management of an open space area.

Ecosystem Health and Climate Change

There is near consensus in the scientific community that the global climate is changing. At this time, it is not clear what the future climatic regime will be for the San Diego mountains.

"The rate at which we are changing the atmosphere will produce a much more rapid climate change than most of the climate changes in the past. When there's been a very rapid climate change in the past--for example, at the end of the last glacial period--plant species had a hard time keeping up with the temperature change. Now we may be causing climate changes of several degrees in less than a century. That's an order of magnitude faster than most of the climate changes in the past. In the worst-case scenario, you could have a climate that changed so much during the lifetime of a single tree that the tree was only briefly in the best environment for its growth. This would be tremendously disruptive, even in managed ecosystems; in natural ecosystems it would be devastating. There would be widespread extinction of species."

-- Dr. Margaret Davis, forest paleoecologist

A long-term monitoring program should be launched on the Preserve to assess the short- and long-term dynamics of the species and communities on the Ranch. Such dynamics were evident over the short time-scale of this study. Signs of an ailing ecosystem were present in the vegetation in 2002 primarily from drought stress resulting in premature leaf drop, induced dormancy, lack of flowering/fruiting, severe insect damage, and even death. Pools observed in 2002 that were drying-out were under tremendous pressure from wildlife owing to the hundreds of tracks observed around the pools. Stands of dead alders occur along the creek on the East Ranch. Many of the Coulter pines are infected with the western pine bark beetle (*Dendroctonus brevicomis*). In some place, ripgut grass is thick and prolific on the preserve. Stands of tree-of-heaven are common also. The year 2003 was a drastic and extreme improvement over the dire conditions evident in 2002.

An adaptive management approach should be adopted for the Preserve. This approach is one that constantly strives to update its land area information (biological and cultural as well as other types of information) and then integrates the new information into the overall management of the area. An "ecosystem health assessment" should be made

on the preserve and should include monitoring water levels and quality along the creek. The creek is the heart of the preserve and if it is not healthy, other ecosystem elements may be affected. Each ecosystem should be evaluated for its "health and viability" in addition to simply identifying them. This information can then be used to make proper management decisions.

Post-Cedar Fire Recommendations

Basically, the recommendation is to leave the area to recover on its own unless landslides are likely that threaten human health or safety or the water quality of Santa Ysabel Creek. Areas damaged from fire fighting activities, in keeping with the recommendations above, should be stabilized especially if slopes are greater than about 30%. Areas should then be allowed to recover on their own. If reseeding is necessary, sites should be seeded with or replanted from stock grown-out from local seed.

VII. Suggested Future Projects

Possible future restoration, monitoring, or management projects for the Preserve include:

- Post-fire recovery monitoring for herbs, shrubs and trees, including plant Species of Interest that may have been affected by the fire.
- An ecosystem health assessment once every five years which includes identifying any diseased trees (e.g., Coulter pines) or possible large scale plant diseases or infestations, includes estimating severity, and further monitoring needs. An ecosystem health assessment can include many of the components mentioned below such as a hydrology element, woody species health, exotic species proliferation, user impacts, etc.
- On-going exotic plant inventory.
- On-going grass species inventory (can be combined with the above).
- Continuation of all inventories to build on baseline knowledge of the wildland area.
- Consider autecological (species-specific) studies on rare plants that occur on the preserve. Monitoring of species most potentially affected by human activity may also be undertaken.
- Hydrological study of creek and long-term monitoring of the creek and water levels. White alder (*Alnus rhombifolia*) trees by default will indicate water levels. These species cannot stand to have their "feet dry" and may respond rapidly to changes in water levels. Dead white alder occur on the East Ranch of the preserve.
- Experimental plots to determine a possible management methodology to eliminate or reduce the spread of ripgut and other noxious invasives.
- Big Trees and Regeneration Study (coast live and Engelmann oaks, sycamores and possibly big-cone Douglas fir). Locate largest trees on the preserve, take d.b.h. and

make assessment of regeneration. Determine age classes of trees and therefore, viability of forest and woodland ecosystems. Monitor oaks for signs of SODS.

- Butterfly Inventory/Insect Inventory. All of the major host plants and most of the known nectar plants for the Quino checkerspot butterfly (*Euphydryas editha quino*) occur on the Preserve making it a possible candidate for reintroduction of the Quino checkerspot butterfly.
- Aquatic invertebrates inventory. These species act as excellent indicators for the overall health of the Creek.

VIII. Acknowledgements

The year 2003 was an extremely difficult one for me and without the help and understanding of the folks listed below, I would not have been able to complete this project. I bid a hearty 'adieu to the year 2003.

As often happens to naturalists and biologists, they develop a deep appreciation for a places they survey. I have grown to love Santa Ysabel Preserve and all its amazing biodiversity which must be protected. I thank The Nature Conservancy for allowing me the chance to survey this very special place.

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In remembrance: I did not know the Edwards Family but every time I was on the preserve, I thanked them for their tremendous foresight in choosing to preserve this property and I thank The Nature Conservancy for making in possible--what an important and precious gift to the future generations of San Diego County.

Among the scenes which are deeply impressed
on my mind, none exceed in sublimity
the primeval forests undefaced by the hand of man
no one can stand in these solitudes unmoved,
and not feel that there is more in man than
the mere breath of his body.
- Charles Darwin

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X. Maps and Figures

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Figure 1. View of the East Ranch with scrub oak chaparral, mixed montane forest, non-native and native grassland, and Engelmann oak all in one scene.



Figure 2 . View looking southeast from the East Ranch.



Figure 3. Typical view of the northern portion of the West Ranch--chaparral among the outcrops.



Figure 4. Engelmann oak savannah with non-native and native grassland on the West Ranch.-



Figure 5. One of the many large and impressive lady fingers (*Dudleya edulis*) in the “Dudleya Garden” on the East Ranch.



Figure 6. Dwarf brodiaea (*Brodiaea terrestris kernensis*) reaches towards the sun on the East Ranch



Figure 7. Western Azalea (*Rhododendron occidentale*) growing along Santa Ysabel creek on the East Ranch.



Figure 8. Many outcrops on the Preserve had seeps associated with them such as these outcrops on the West Ranch covered with water-loving seep monkeyflower (*Mimulus guttatus*).



Figure 9. Three awn (*Aristida purpurea longiseta*) meadow with other associated species: Wright's eriogonum (*Eriogonum wrightii membranaceum*), nodding needlegrass *Nassella cernua*, and mule ears (*Wyethia ovata*).



Figure 10. Flowering *Hymenothrix wrightii* on the East Ranch



Figure 11. One of the many old-growth oaks (*Quercus agrifolia*) on the preserve.
Taken on West Ranch.



Figure 12. An old growth coast live oak “bustin’ out”.



Figure 13. Native needlegrass and wildflower meadow. Blue eyed grass (*Sisyrinchium bellum*), purple owl's clover (*Castilleja purpurea*), and last year's flowering culms of native needlegrass color the hillside on the East Ranch.



Figure 14. Stands of white alder occurred frequently on the westernmost portion of Santa Ysabel Creek on the East Ranch. Dead stands of alder are found along the creek.



Figure 15. San Diego gumplant (*Grindelia hirsutula hallii*) on the East Ranch “grins” at the camera.



Figure 16. One of San Diego Gumplant's preferred habitats on the East Ranch.



Figure 17. Bank erosion along Santa Ysabel Creek on the East Ranch.



Figure 18. The main ranch road on the East Ranch that bisects the mosaic of wetlands in the valley.



Figure 19. Example of type of wetland that occurs in eastern valley of the East Ranch and is adjacent to one of the main ranch roads.



Figure 20. Dead Coulter Pines on East Parcel of Santa Ysabel Preserve.
Area burned in 2003.



Figure 21. Needlegrass (*Nassella* sp.) drowns in a sea of filaree
(*Erodium* spp.) on the West Ranch.



Figure 22. Dead golden eagle found on the East Ranch, August 2003.

APPENDICES 1-6

Appendix 1

GEOLOGY AND SOILS OF THE SANTA YSABEL RANCH OPEN SPACE PRESERVE

Geology

JM: mixed rocks of quartz diorite and schist

TRI: Julian schist

KS: San Marcos garbo; very little represented on the preserve.

Soils

| Type | Derived from: | Name | %Slope |
|-------------|----------------------------------------|---------------------------------|---------------|
| CaB | granitic alluvium | Calpine coarse sandy loam | 2-5% |
| CtE | acid igneous rock and micaceous schist | Crouch coarse sandy loam | 5-30% |
| CtF | | Crouch coarse sandy loam | 30-50% |
| CuG | | Crouch rocky coarse sandy loam | 30-70% |
| HmD | micaceous schist | Holland fine sandy loam | 5-15% |
| HnE | | Holland stony fine sandy loam | 5-30% |
| HnG | | Holland stony fine sandy loam | 30-60% |
| HoC | | Holland fine sandy loam | 2-9% |
| Rm | riverwash | in association with streams | |
| SpE2 | micaceous schist and gneiss | Sheephead rocky fine sandy loam | 9-30% |

Information obtained from:

Division of Mines, 1958. Geology and Mineral Resources of Santa Ysabel Quadrangle, San Diego County, California. San Francisco. Bulletin 177.

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Appendix 2

LIST OF POTENTIAL PLANTS OF INTEREST* ON SANTA YSABEL RANCH OPEN SPACE PRESERVE

Obtained from: Sproul, 2001; J. Hirshberg as cited by Sproul/others; herbarium records; NDDB records; Beauchamp 1986; personal communications with other botanists; and, personal experience.

Compiled by: VIRGINIA MORAN

| Name | Abbreviation |
|--------------------------------------------|--------------|
| <i>Agrostis diegoensis</i> | Agdi |
| <i>Allium parryi</i> | Alpa |
| <i>Androsace elongata</i> | Anel |
| <i>Arabis hirshbergiae</i> | Arhi |
| <i>Aristida purpurea</i> | Arpu |
| <i>Arenaria pusilla diffusa</i> | Arpd |
| <i>Artemisia palmeri</i> | Arpa |
| <i>Astragalus oocarpus</i> | Asoo |
| <i>Aspidotus densa</i> | Asde |
| <i>Boykinia rotundifolia</i> | Boro |
| <i>Brodiaea orcutii</i> | Bror |
| <i>Brodiaea terrestris kernensis</i> | Brtk |
| <i>Calochortus amabilis</i> | Caam |
| <i>Calochortus dunnii</i> | Cadu |
| <i>C. invenustus</i> | Cain |
| <i>Castilleja lasiorhyncha</i> | Cala |
| <i>Caulanthus pseudosimulans</i> | Caps |
| <i>Caulanthus heterophyllus h</i> | Cahh |
| <i>Ceanothus foliosus</i> | Cefo |
| <i>Celtis reticulata</i> | Cere |
| <i>Chaenactis parishii</i> | Chpa |
| <i>Chimaphilia menziesii</i> | Chme |
| <i>Chorizanthe polygonoides longispina</i> | Chpl |
| <i>Chorizanthe procumbens</i> | Chpr |
| <i>Cercis occidentalis</i> | Ceoc |
| <i>Clarkia delicata</i> | Clde |
| <i>Cupressus stephensonii</i> | Cust |
| <i>Delphinium hesperium cuyamaca</i> | Dehc |
| <i>D. parishii subglobosum</i> | Deps |
| <i>Downingia concolor brevior</i> | Docb |
| <i>Dudleya saxosa aloides (alainae)</i> | Dsaa |
| <i>Echinocereus engelmannii munzii</i> | Ecem |
| <i>Ericameria cuneata macrocephala</i> | Ercm |
| <i>Euonymus occidentalis parishii</i> | Euop |
| <i>Galium angustifolium borregoense</i> | Gaab |
| <i>Gilia caruifolia</i> | Gica |
| <i>Grindelia hirsutula hallii</i> | Grhh |
| <i>Helianthella californica nevadensis</i> | Hecn |
| <i>Heuchera brevistaminea</i> | Hebr |

| | |
|---------------------------------------------|------|
| <i>Heuchera rubescens versicolor</i> | Herv |
| <i>Horkelia clevelandii</i> | Hocl |
| <i>Hulsea californica</i> | Huca |
| <i>Hymenothrix wrightii</i> | Hywr |
| <i>Juniperus californica</i> | Juca |
| <i>Lessingia glandulifera tomentosa</i> | Legt |
| <i>Lewisia brachycalyx</i> | Lebr |
| <i>Lilium humboldtii ocellatum</i> | Liho |
| <i>L. pardalinum</i> | Lipa |
| <i>L. parryi</i> | Lipy |
| <i>Limnanthes gracilis parishii</i> | Ligp |
| <i>Linanthus orcuttii</i> | Lior |
| <i>Machaeranthera asteroides lagunensis</i> | Maal |
| <i>Malacothamnus aboriginum</i> | Maab |
| <i>Mimulus palmeri (diffusus)</i> | Mipa |
| <i>Moehringia macrophylla</i> | Moma |
| <i>Monardella hypoleuca hypoleuca</i> | Mohh |
| <i>Monardella macrantha hallii</i> | Momh |
| <i>Monardella macrantha macrantha</i> | Momm |
| <i>Monardella nana tenuiflora</i> | Mont |
| <i>Monardella nana leptosiphon</i> | Monl |
| <i>Muilla clevelandii</i> | Mucl |
| <i>Nassella cernua</i> | Nace |
| <i>Navarretia tagetina</i> | Nata |
| <i>Poa atropurpurea</i> | Poat |
| <i>Polygonum parryi</i> | Popa |
| <i>Potentilla glandulosa</i> | Pogl |
| <i>P. gracilis fastigata</i> | Pogf |
| <i>Pseudostuga macrocarpa</i> | Psma |
| <i>Psoralea rigida</i> | Psri |
| <i>Quercus engelmannii</i> | Quen |
| <i>Ranunculus aquatilis hispidulus</i> | Raah |
| <i>Rhododendron occidentale</i> | Rhoc |
| <i>Ribes amarum</i> | Riam |
| <i>Ribes nevadense</i> | Rine |
| <i>Rosa gymnocarpa</i> | Rogy |
| <i>Rubus glaucifolius ganderi</i> | Rugg |
| <i>Salvia clevelandii</i> | Sacl |
| <i>Salvia sonomensis</i> | Saso |
| <i>Sanguisorba occdientalis</i> | Saoc |
| <i>Scutellaria bolanderi austromontana</i> | Scba |
| <i>Selaginella asprella</i> | Seas |
| <i>Streptanthus campestris</i> | Stca |
| <i>Styrax officinalis redivivus</i> | Stor |
| <i>Thermopsis californica semota</i> | Thcs |
| <i>Viola lobata integrifolia</i> | Vili |
| <i>V. l. lobata</i> | Vill |

*A "plant of interest" is defined as a federally or state listed plant, a CNPS plant, an endemic species, a plant vulnerable to human impacts, a plant of limited range, the host plants for the Laguna Mt skipper, or otherwise worthy of special note.

Appendix 3

PLANT SPECIES OF INTEREST KNOWN TO OCCUR ON THE PRESERVE AS OF AUGUST 2003

Ranks are those listed by the California Department Fish and Game, California Natural Diversity Database, Special Plants List, October 2003.

East Ranch=**ER**
West Ranch=**WR**

Banner Dudleya *Dudleya saxosa aloides* **ER/WR**
Subspecies *saxosa saxosa* is listed by CNDDDB, but this subspecies is not listed by CNDDDB

Habitat and or plant community where found: rock outcrops adjacent to Santa Ysabel Creek. *Notes:* Locally common along Santa Ysabel Creek in outcrops

Bitter Gooseberry *Ribes amarum* **ER**
CNDDDB lists subspecies *hoffmannii*, but Jepson submerges this into species.
No state or federal status
CNPS List-3

Habitat and/or plant community where found: riparian woodland understory along Santa Ysabel Creek. *Notes:* Uncommon along SY Creek.

Caraway-leaved Gilia *Gilia (Saltugilia) caruifolia* **ER**
No state or federal status
CNPS-List 4

Habitat and/or plant community where found: opening in chaparral and within outcrops.
Notes: Uncommon in openings in chaparral

Cleveland Sage *Salvia clevelandii* **WR/ER**
No longer listed by NDDB

Habitat and/or plant community where found: chamise chaparral

Descanso (San Diego) milkvetch *Astragalus oocarpus* **WR/ER**
No state or federal status
CNPS List-1B

Habitat and/or plant community where found: grassy understory of scrub/Engelmann oak. *Notes:* Large patch found dead in 2002. Confirmed dead in 2003. Infrequently, patches occur.

Engelmann Oak *Quercus engelmannii* **WR/ER**
No state or federal status
CNPS List-4

Habitat and/or plant community where found: forms its own large plant community.
Notes: Dominant species on both Ranches

Jewelflower *Caulanthus heterophyllus heterophyllus* **WR/ER**
Taxonomic conundrum at present.
Synonymous with *Streptanthus heterophyllus* (Rollins)
Considered to be synonymous with *Caulanthus stenocarpus* (Buck-Jepson Manual)
Caulanthus stenocarpus is considered to be synonymous with *Caulanthus lasiophyllus lasiophyllus* (Rollins)
Caulanthus heterophyllus has been split into two subspecies: *heterophyllus* and *pseudosimulans* (Buck).
C. h. pseudosimulans is listed by CNDDDB with no status (January 2003).

Habitat and/or plant community where found: openings in chaparral or within outcrops
Notes: Uncommon; occurs in openings at boulder/chaparral interface

Kern's Brodiaea *Brodiaea terrestris kernensis* **ER**
Not listed by CNDDDB

Habitat and/or plant community where found: matchweed meadow, mixed wildflower /non-native grassland, native grassland, wet meadow and drainages (Kanaka Flats)

Long-spined Spineflower *Chorizanthe polygonoides longispina* **ER**
No state or federal status
CNPS List-1B

Habitat and/or plant community where found: in the road next to junegrass-bluegrass "pebble plain" growing on Julian schist

Mountain pink currant *Ribes nevadense* **ER**
Not listed by CNDDDB

Habitat and/or plant community where found: riparian woodland understory along Santa Ysabel Creek; uncommon.

Palmer's sagewort *Artemisia palmeri* **ER**
No state or federal status
CNPS- List 4

Habitat and/or plant community where found: ruderal field next to Famer's Road; one plant located but not particularly rare in county

Palomar monkeyflower *Mimulus (diffusus) palmeri* **ER**
M. diffusus has been submerged into *M. palmeri* (Thompson-Jepson Manual)
No state or federal status
CNPS List-4

Habitat and/or plant community where found: opening in chaparral and within outcrops.
about 50 plants found in single patch; outcrops in Engelmann oak/chaparral

Prostrate Spineflower *Chorizanthe procumbens* **WR**
Not listed by CNDDB

Habitat and/or plant community where found: openings in chamise chaparral; frequent.

San Diego Gumplant *Grindelia hirsutula hallii* **WR/ER**
No state or federal status
CNPS-List 1B

Habitat and/or plant community where found: meadows, wet areas, grasslands, dirt roads, disturbed areas, native and non-native grasslands, ruderal areas; more common on the East Ranch

San Felipe Monardella *Monardella nana leptosiphon* **ER**
No state or federal status
CNPS List-1B

Habitat and/or plant community where found: mountain mahogany and white sage chaparral on the edge of mixed/oak coniferous forest; scattered patches located in mountain mahogany/chamise chaparral.

Western Azalea *Rhododendron occidentale* **ER**
Not listed by CNDDB

Habitat and/or plant community where found: oak riparian woodland along creek; three plants found on preserve thus far

Wright's Hymenothrix *Hymenothrix wrightii* **ER**
No state or federal status
CNPS List-4

Habitat and/or plant community where found: matchweed meadow and native grassland (three-awn); locally dominant to co-dominant species in three-awn and matchweed meadow; widely distributed on east Ranch

Yellow (Velvety) False Lupine *Thermopsis californica semota* **ER**
No state or federal status
CNPS List-1B

Habitat and/or plant community where found: patch of non-native grass within white sage/buckwheat "scrub"; only one small patch located

Appendix 4

FLORISTICS LIST OF THE SANTA YSABEL PRESERVE BASED ON 2002-2003 SURVEYS

Found on both parcel unless otherwise indicated then EP=East Parcel and WP=West Parcel.

*=Non-native species

^{SI}=Species of Interest

Nomenclature follows that of Simpson and Rebman (2001) and Hickman, 1996 (Jepson Manual).

Monocots

Lycopods

Selaginellaceae-Spike-moss Family

Selaginella bigelovii Bigelow's spike-moss

Sphenopsids

Equisetaceae-Horsetail Family

Equisetum arvense common horsetail
Equisetum hyemale affine scouring Rush

Ferns

Blechnaceae

Woodwardia fimbriata giant chain fern ER

Dennstaedtiaceae (Polypodiaceae)-Bracken Family

Pteridium aquilinum var. *pubescens* western bracken fern

Dryopteridaceae (Polypodiaceae)-Wood Fern Family

Cystopteris fragilis brittle bladder fern
Dryopteris arguta coastal wood fern
Polystichum imbricans imbricans imbricate sword fern

Polypodiaceae-Polypody Family

Polypodium californicum California polypody

Pteridaceae (Polypodiaceae)-Brake Family

Adiantum jordanii California maidenhair
Aspidotis californica California lacefern
Cheilanthes sp. cotton fern
Pellaea andromedifolia coffee fern
Pentagramma (Pityrogramma) goldenback fern
triangularis triangularis

Conifers

Cupressaceae-Cypress Family

Calocedrus decurrens California incense cedar ER

Pinaceae-Pine Family

Pinus coulteri Coulter pine
Pseudotsuga macrocarpa big-cone Douglas fir ER

Dicots

Amaranthaceae-Amaranth Family

| | |
|--------------------------------|---------------------|
| * <i>Amaranthus albus</i> | white tumbleweed |
| * <i>Amaranthus blitoides</i> | prostrate amaranth |
| <i>Amaranthus californicus</i> | California amaranth |

Anacardiaceae-Sumac or Cashew Family

| | |
|-----------------------------------|--------------|
| <i>Malosma laurina</i> | laurel sumac |
| <i>Rhus ovata</i> | sugar bush |
| <i>Rhus trilobata</i> | basket bush |
| <i>Toxicodendron diversilobum</i> | poison oak |

Apiaceae-Umbel or Carrot Family

| | |
|---------------------------------------|-------------------------|
| <i>Apiastrum angustifolium</i> | mock parsley |
| <i>Daucus pusillus</i> | rattlesnake weed |
| * <i>Foeniculum vulgare</i> | wild fennel |
| <i>Lomatium dasycarpum dasycarpum</i> | woolly fruit lomatium |
| <i>Lomatium lucidum</i> | shiny lomatium |
| <i>Oenanthe sarmentosa</i> | Pacific oenanthe |
| <i>Osmorhiza brachypoda</i> | California sweet-cicely |
| <i>Sanicula arguta</i> | sharp-tooth sanicle |
| <i>Sanicula bipinnatifida</i> | purple sanicle |

Asclepiadaceae-Milkweed Family

| | |
|-------------------------------|----------------------|
| <i>Asclepias californica</i> | California milkweed |
| <i>Asclepias fascicularis</i> | narrow leaf milkweed |

Asteraceae-Sunflower Family

| | | |
|---------------------------------------------|-------------------------|----|
| <i>Achillea millefolium</i> | yarrow | |
| <i>Acourtia microcephala</i> | sacapellote | |
| <i>Agoseris heterophylla</i> | woodland agoseris | |
| <i>Agoseris retorsa</i> | spear-leaf agoseris | |
| <i>Ambrosia psilostachya</i> | western ragweed | |
| <i>Artemisia californica</i> | California sagebrush | |
| <i>Artemisia douglasiana</i> | Douglas mugwort | |
| <i>Artemisia dracunculus</i> | dragon sagewort | |
| <i>Artemisia ludoviciana ludoviciana</i> | silver wormwood | |
| ^{Sl} <i>Artemisia palmeri</i> | Palmer's sagewort | ER |
| <i>Aster bernardinus</i> | San Bernardino aster | ER |
| <i>Baccharis salicifolia</i> | mule-fat | |
| <i>Baccharis sarothroides</i> | broom baccharis | |
| <i>Brickellia californica</i> | California brickellbush | |
| * <i>Centaurea melitensis</i> | totalote | |
| * <i>Centaurea solstitialis</i> | yellow star thistle | |
| <i>Chaenactis glabriuscula glabriuscula</i> | yellow pincushion | |
| <i>Cirsium occidentale</i> | thistle | |
| <i>Cirsium scariosum</i> | bird's-nest thistle | |
| * <i>Cirsium vulgare</i> | bull thistle | |
| * <i>Cnicus benedictus</i> | blessed thistle | |
| * <i>Conyza canadensis</i> | horseweed | |
| * <i>Cotula coronopifolia</i> | brass buttons | |
| <i>Deinandra fasciculata</i> | fascicled tarweed | |

| | | |
|--------------------------------------------------|------------------------------|----|
| <i>Ericameria brachylepis</i> | boundary goldenbush | |
| <i>Ericameria linearifolia</i> | interior goldenbush | |
| <i>Ericameria?</i> | | |
| <i>Erigeron foliosus foliosus</i> | leafy daisy | |
| <i>Eriophyllum confertiflorum confertiflorum</i> | golden yarrow | |
| <i>Euthamia occidentalis</i> | western goldenrod | |
| <i>Filago arizonica</i> | filago | |
| <i>Filago californica</i> | California filago | |
| <i>Filago depressa</i> | dwarf filago | |
| <i>*Filago gallica</i> | narrow-leaf filago | |
| <i>Gnaphalium canescens beneolens</i> | fragrant everlasting | |
| ^{SI} <i>Grindelia hirsutula hallii</i> | San Diego or Hall's gumplant | |
| <i>Gutierrezia sarothrae</i> | matchweed | |
| <i>Hazardia squarrosa grindelioides</i> | saw-tooth goldenbush | |
| <i>*Hedypnois cretica</i> | crete weed (hedypnois) | WR |
| <i>Helianthus gracilentus</i> | slender sunflower | |
| <i>Heterotheca grandiflora</i> | telegraph weed | |
| <i>Heterotheca sessiliflora sessiliflora</i> | golden aster | |
| ^{SI} <i>Hymenothrix wrightii</i> | Wright's hymenothrix | ER |
| <i>*Hypochaeris glabra</i> | smooth cat's ear | |
| <i>*Hypochaeris radicata</i> | hairy or rough cat's ear | |
| <i>Isocoma menziesii menziesii</i> | spreading goldenbush | WR |
| <i>*Lactuca serriola</i> | prickly lettuce | |
| <i>Lasthenia californica</i> | goldfields | |
| <i>Lessingia filaginifolia filaginifolia</i> | cudweed aster | |
| <i>Madia elegans</i> | elegant madia | |
| <i>Madia gracilis</i> | slender madia | |
| <i>Malacothrix californica</i> | desert dandelion | WR |
| <i>Micropus californicus</i> | slender cottonweed | |
| <i>Osmadenia tenella</i> | osmadenia | |
| <i>*Picris echioides</i> | bristly ox-tongue | |
| <i>Rafinesquia californica check</i> | chicory | |
| <i>Solidago californica</i> | California goldenrod | |
| <i>*Sonchus asper</i> | prickly sow-thistle | |
| <i>*Sonchus oleraceus</i> | common sow-thistle | |
| <i>Stephanomeria exigua deanei</i> | small wreath-plant | |
| <i>Stylocline gnaphaloides</i> | everlasting nest-straw | |
| <i>*Taraxacum officinale</i> | common dandelion | |
| <i>*Tragopogon dubius</i> | goats-beard | |
| <i>Uropappus lindleyi</i> | silver puffs | |
| <i>Wyethia ovata</i> | mule ears | |
| <i>Xanthium strumarium</i> | cockelbur | |

Berberidaceae-Barberry Family

| | | |
|-------------------------------------|---------------------|----|
| <i>Berberis aquifolium dictyota</i> | California barberry | ER |
|-------------------------------------|---------------------|----|

Betulaceae-Birch Family

| | | |
|--------------------------|-------------|----|
| <i>Alnus rhombifolia</i> | white alder | ER |
|--------------------------|-------------|----|

Bignoniaceae-Catalpa Family

| | | |
|-----------------------------|---------|----|
| <i>Catalpa bignonioides</i> | catalpa | ER |
|-----------------------------|---------|----|

Boraginaceae-Borage Family

| | |
|---------------------------------------|-----------------------|
| <i>Amsinckia menziesii intermedia</i> | fiddleneck |
| <i>Cryptantha affinis</i> | cryptantha |
| <i>Cryptantha intermedia</i> | nievitas cryptantha |
| <i>Cryptantha micrantha</i> | purpleroot cryptantha |
| <i>Cryptantha muricata</i> | prickly cryptantha |
| <i>Pectocarya pencillata</i> | winged pectocarya |
| <i>Plagiobotrys</i> sp. | popcornflower |
| <i>Plagiobotrys bracteatus</i> | bract popcornflower |
| <i>Plagiobotrys nothofulvus</i> | rusty popcornflower |

Brassicaceae-Mustard Family

| | |
|-------------------------------------------------------------|----------------------|
| * <i>Arabis glabra glabra</i> | tower mustard |
| <i>Arabis puchra pulchra</i> | beautiful rock cross |
| <i>Arabis sparsiflora californica</i> | purple rock cress |
| * <i>Barbarea orthoceras</i> | winter cress |
| * <i>Capsella bursa-pastoris</i> | shepherd's purse |
| <i>Cardamine californica californica</i> | toothwort |
| ^{sl} <i>Caulanthus heterophyllus heterophyllus</i> | caulanthus |
| <i>Erysimum capitatum capitatum</i> | western wallflower |
| <i>Gullenia lasiophylla</i> | California mustard |
| * <i>Hirschfeldia incana</i> | short-pod mustard |
| <i>Lepidium lasiocarpum lasiocarpum</i> | sand peppergrass |
| <i>Lepidium nitidum nitidum</i> | shining peppergrass |
| * <i>Raphanus sativus</i> | wild radish |
| <i>Rorippa nasturtium-aquaticum</i> | water cress |
| * <i>Sisymbrium altissimum</i> | rocket mustard |
| * <i>Sisymbrium officinale</i> | tumble mustard |
| <i>Thysanocarpus curvipes</i> | fringedpod |

Cactaceae-Cactus Family

| | |
|------------------------------------|-------------------|
| <i>Opuntia basilaris basilaris</i> | beavertail cactus |
| <i>Opuntia phaeacantha</i> | prickly pear |

Caprifoliaceae-Honeysuckle Family

| | |
|-------------------------------------|----------------------|
| <i>Lonicera subspicata denudata</i> | southern honeysuckle |
| <i>Sambucus mexicana</i> | elderberry |
| <i>Symphoricarpos mollis</i> | creeping snowberry |

Caryophyllaceae-Pink Family

| | |
|-------------------------------------|---------------------|
| * <i>Cerastium fontanum vulgare</i> | chickweed |
| * <i>Cerastium glomeratum</i> | mouse-ear chickweed |
| * <i>Silene gallica</i> | common catchfly |
| <i>Silene laciniata major</i> | cardinal catchfly |
| * <i>Spergula arvensis arvensis</i> | starwort |
| <i>Stellaria nitens</i> | shining chickweed |
| * <i>Stellaria media</i> | common chickweed |

Chenopodiaceae-Goosefoot or Amaranth Family

| | |
|---------------------------------|----------------------|
| <i>Chenopodium californicum</i> | California goosefoot |
| * <i>Salsola tragus</i> | Russian thistle |

Cistaceae

| | |
|-------------------------------|----------------|
| <i>Helianthemum scoparium</i> | peak rush-rose |
|-------------------------------|----------------|

Convolvulaceae-Morning Glory Family

| | |
|-------------------------------|--|
| <i>Calystegia macrostegia</i> | |
|-------------------------------|--|

Cornaceae-Dogwood Family

| | | |
|------------------------------------|---------------|----|
| <i>Cornus sericea occidentalis</i> | creek dogwood | ER |
|------------------------------------|---------------|----|

Crassulaceae-Stonecrop Family

| | |
|---------------------------------------------|--------------------|
| <i>Crassula connata</i> | pygmy weed |
| <i>Dudleya edulis</i> | lady's fingers |
| <i>Dudleya lanceolata</i> | lance-leaf dudleya |
| ^{sl} <i>Dudleya saxosa aloides</i> | Banner dudleya |

Cucurbitaceae Family-Cucumber or Gourd Family

| | |
|--------------------------------------|---------------|
| <i>Cucurbita palmata</i> | coyote melon |
| <i>Marah macrocarpus macrocarpus</i> | wild cucumber |
| <i>Cuscuta</i> sp. | dodder |

Datisceae-Datisca Family

| | |
|--------------------------|--------------|
| <i>Datisca glomerata</i> | Durango root |
|--------------------------|--------------|

Ericaceae-Heath Family

| | | |
|-----------------------------------------------|---------------------|----|
| <i>Arctostaphylos glandulosa adamsii</i> | Eastwood manzanita | |
| <i>Arctostaphylos glauca</i> | big berry manzanita | |
| <i>Arctostaphylos pungens</i> | Mexican manzanita | |
| ^{sl} <i>Rhododendron occidentale</i> | western azalea | ER |

Euphorbiaceae-Spurge Family

| | |
|---------------------------------|--------------------|
| <i>Chamaesyce albomarginata</i> | rattlesnake spurge |
| <i>Croton californicus</i> | California croton |
| <i>Eremocarpus setigerus</i> | doveweed |

Fabaceae-Legume Family

| | |
|------------------------------------------|---------------------|
| <i>Amorpha fruticosa</i> | false indigo |
| ^{sl} <i>Astragalus oocarpus</i> | Descanso milkvetch |
| <i>Lathyrus vestitus alefeldii</i> | San Diego sweet pea |
| <i>Lotus argophyllus argophyllus</i> | silver-leaf lotus |
| <i>Lotus crassifolius crassifolius</i> | buck lotus |
| <i>Lotus hamatus</i> | grab lotus |
| <i>Lotus purshianus purshianus</i> | spanish-clover |
| <i>Lotus scoparius scoparius</i> | deerweed |

| | | |
|----------------------------------------------------|------------------------|----|
| <i>Lotus strigosus</i> | Bishop lotus | |
| <i>Lotus wrangelianus</i> | calf lotus | |
| <i>Lupinus bicolor</i> | miniature, dove lupine | |
| <i>Lupinus concinnus</i> | bajada lupine | |
| <i>Lupinus excubitus austromontanus</i> | grape soda lupine | |
| <i>Lupinus hirsutissimus</i> | stinging lupine | |
| <i>Lupinus latifolius parishii</i> | Parish's stream lupine | |
| <i>Lupinus longifolius</i> | Pauma lupine | |
| <i>Lupinus sparsiflorus</i> | Coulter lupine | |
| * <i>Medicago lupulina</i> | black medick | |
| * <i>Medicago polymorpha</i> | California burclover | |
| * <i>Melilotus alba</i> | white sweetclover | |
| * <i>Melilotus indica</i> | Indian sweetclover | |
| * <i>Melilotus officinalis</i> | yellow sweetclover | |
| * <i>Robinia pseudoacacia</i> | black locust | |
| <i>Rupertia rigida</i> | Parish's rupertia | ER |
| ^{Sl} <i>Thermopsis californica semota</i> | velvety false-lupine | ER |
| <i>Trifolium albopurpureum</i> | rancheria clover | |
| <i>Trifolium ciliolatum</i> | tree clover | |
| <i>Trifolium depauperatum amplexens</i> | clover | |
| <i>Trifolium microcephalum</i> | maiden clover | |
| <i>Trifolium obtusiflorum</i> | creek clover | |
| * <i>Trifolium pratense</i> | red clover | |
| * <i>Trifolium repens</i> | white clover | |
| <i>Trifolium variegatum</i> | white-tip clover | |
| <i>Trifolium willdenovii</i> | valley clover | |
| <i>Trifolium wormskoldii</i> | cow clover | |
| <i>Vicia americana americana</i> | American vetch | |

Fagaceae-Oak Family

| | | |
|------------------------------------|----------------------|----|
| <i>Quercus agrifolia agrifolia</i> | coast live oak | |
| <i>Quercus agrofolia oxyadenia</i> | coast live oak | |
| <i>Quercus berberidifolia</i> | scrub oak | |
| <i>Quercus chrysolepis</i> | canyon live oak | ER |
| <i>Quercus engelmannii</i> | Engelmann oak | |
| <i>Quercus X ganderi</i> | Gander's oak | WR |
| <i>Quercus kelloggii</i> | California black oak | |
| <i>Quercus X morehus</i> | oracle oak | |

Frankeniaceae-Frankenia Family

| | | |
|-------------------------|-----------|--|
| <i>Frankenia salina</i> | Frankenia | |
|-------------------------|-----------|--|

Garryaceae-Silk Tassel Family

| | | |
|--------------------------|--------|--|
| <i>Garrya flavescens</i> | Garrya | |
| <i>Garrya veatchii</i> | Garrya | |

Gentianaceae-Gentian Family

| | | |
|----------------------------|-------------|----|
| <i>Centaurium venustum</i> | canchalagua | |
| <i>Swertia parryi</i> | deer's ears | ER |

Geraniaceae-Geranium Family

| | | |
|--------------------------------|-------------------|----|
| * <i>Erodium botrys</i> | long-beak filaree | |
| * <i>Erodium cicutarium</i> | red-stem filaree | |
| * <i>Geranium carolinianum</i> | Carolina geranium | WR |

Grossulariaceae-Gooseberry Family

| | | |
|--------------------------------------|-----------------------|----|
| ^{Sl} <i>Ribes amarum</i> | bitter gooseberry | ER |
| <i>Ribes indecorum</i> | white-flower currant | |
| ^{Sl} <i>Ribes nevadense</i> | mountain-pink currant | ER |
| <i>Ribes quercetorum</i> | oak gooseberry | ER |

Hydrophyllaceae-Waterleaf Family

| | | |
|----------------------------------------------|----------------------|--|
| <i>Eriodictyon crassifolium crassifolium</i> | yerba santa | |
| <i>Eriodictyon trichocalyx lanatum</i> | yerba santa | |
| <i>Eucrypta chrysanthemifolia</i> | | |
| <i>chrysanthemifolia</i> | eucrypta | |
| <i>Nemophila menziesii integrifolia</i> | baby blue eyes | |
| <i>Phacelia cicutaria hispida</i> | caterpillar phacelia | |
| <i>Phacelia distans</i> | wild heliotrope | |
| <i>Phacelia parryi</i> | Parry's phacelia | |
| <i>Phacelia ramosissima</i> | | |

Juglandaceae-Walnut Family

| | | |
|----------------------------------------|--------------|----|
| <i>Juglans californica californica</i> | black walnut | ER |
|----------------------------------------|--------------|----|

Lamiaceae-Mint Family

| | | |
|--------------------------------------------------|-----------------------|----|
| * <i>Marrubium vulgare</i> | horehound | |
| * <i>Mentha pulegium</i> | pennyroyal | |
| <i>Monardella lanceolata lanceolata</i> | mustang mint | ER |
| ^{Sl} <i>Monardella nana leptosiphon</i> | San Felipe monardella | ER |
| <i>Salvia apiana</i> | white sage | |
| ^{Sl} <i>Salvia clevelandii</i> | Cleveland sage | |
| <i>Salvia columbariae</i> | chia | |
| <i>Salvia X palmeri</i> | Palmer's sage | |
| <i>Stachys ajugoides rigida</i> | hedge-nettle | |
| <i>Trichostema parishii</i> | mountain bluecurls | |
| <i>Trichostema lanceolatum</i> | vinegar weed | |

Linaceae-Flax Family

| | | |
|------------------------------|-----------|--|
| <i>Linum lewisii lewisii</i> | wild flax | |
|------------------------------|-----------|--|

Malvaceae-Mallow Family

| | | |
|-----------------------------------------|------------------|--|
| <i>Malacothamnus fasciculatus</i> | chaparral mallow | |
| * <i>Malva parviflora</i> | cheeseweed | |
| <i>Sidalcea malvaeflora sparsifolia</i> | checker-bloom | |

Nyctaginaceae-Four-O'clock Family

| | | |
|---------------------------------------------------|----------------|--|
| <i>Mirabilis californica (laevis crassifolia)</i> | wishbone plant | |
|---------------------------------------------------|----------------|--|

Oleaceae-Olive Family

| | | |
|--------------------------|------------|----|
| <i>Fraxinus velutina</i> | velvet ash | ER |
|--------------------------|------------|----|

Onagraceae-Evening-Primrose Family

| | | |
|---------------------------------------|--------------------------------|----|
| <i>Camissonia bistorta</i> | California sun-cup | |
| <i>Camissonia boothii condensata</i> | desert lantern | |
| <i>Camissonia californica</i> | false-mustard | |
| <i>Camissonia confusa</i> | sun cup | |
| <i>Camissonia hirtella</i> | field sun cup | |
| <i>Camissonia ignota</i> | camissonia | WR |
| <i>Camissonia micrantha</i> | camissonia | WR |
| <i>Clarkia purpurea quadrivulnera</i> | four-spot clarkia | |
| <i>Clarkia rhomboidea</i> | diamond clarkia | |
| <i>Epilobium brachycarpum</i> | summer cotton weed | |
| <i>Epilobium canum latifolium</i> | Zauschneria/California fuschia | |
| <i>Epilobium ciliatum ciliatum</i> | willow herb | |
| <i>Epilobium densiflorum</i> | spike primrose | ER |
| <i>Oenothera elata hookeri</i> | great marsh evening primrose | ER |

Orobanchaceae-Broom-Rape Family

| | |
|------------------------------|----------------------|
| <i>Orobanche fasciculata</i> | clustered broom-rape |
|------------------------------|----------------------|

Paeoniaceae-Peony Family

| | |
|----------------------------|------------------|
| <i>Paeonia californica</i> | California peony |
|----------------------------|------------------|

Papaveraceae-Poppy Family

| | |
|---------------------------------|-------------------|
| <i>Eschscholzia californica</i> | Californica poppy |
| <i>Papaver californicum</i> | fire poppy |
| <i>Platystemon californicus</i> | cream cups |

Plantaginaceae-Plantain Family

| | |
|----------------------------|-----------------|
| <i>Plantago patagonica</i> | desert plantain |
|----------------------------|-----------------|

Platanaceae-Sycamore Family

| | |
|--------------------------|------------------|
| <i>Platanus racemosa</i> | western sycamore |
|--------------------------|------------------|

Polemoniaceae Family-Phlox Family

| | | |
|------------------------------------------|------------------------|----|
| <i>Allophyllum glutinosum</i> | blue false-gilia | ER |
| <i>Eriastrum densiflorum elongatum</i> | chaparral woolly-star | WR |
| <i>Eriastrum sapphirinum sapphirinum</i> | woolly-star | |
| <i>Gilia angelensis</i> | grassland gilia | |
| <i>Saltugilia australis</i> | southern gilia | |
| <i>Gilia clivorum</i> | | ER |
| <i>Leptosiphon liniflorus</i> | Great Basin linanthus | |
| <i>Leptosiphon parviflorus</i> | coast baby-star | |
| <i>Linanthus dianthiflorus</i> | farinose ground pink | |
| <i>Navarretia atractylodes</i> | holly-leaved skunkweed | |
| <i>Navarretia hamata hamata</i> | skunkweed | WR |

| | | |
|--------------------------------------------|--------------------|----|
| ^{Sl} <i>Saltugilia caruifolia</i> | caraway-leaf gilia | ER |
|--------------------------------------------|--------------------|----|

Polygonaceae-Buckwheat Family

| | | |
|---------------------------------------------------------|-----------------------------|----|
| <i>Chorizanthe fimbriata laciniata</i> | laciniate spineflower | |
| ^{Sl} <i>Chorizanthe polygonides longispina</i> | knotweed spineflower | ER |
| ^{Sl} <i>Chorizanthe procumbens</i> | prostrate spineflower | WR |
| <i>Chorizanthe staticoides</i> | turkish rugging | |
| <i>Eriogonum elongatum elongatum</i> | tall buckwheat | |
| <i>Eriogonum fasciculatum fasciculatum</i> | California buckwheat | |
| <i>Eriogonum fasciculatum polifolium</i> | rosemary flat-top buckwheat | |
| <i>Eriogonum fasciculatum foliolosum</i> | interior flat-top buckwheat | |
| <i>Eriogonum gracile gracile</i> | slender buckwheat | |
| <i>Eriogonum roseum</i> | virgate buckwheat | |
| <i>Eriogonum wrightii membranaceum</i> | Wright's buckwheat | |
| <i>Lastarriaea coriacea</i> | Lastarriaea | |
| * <i>Polygonum arenastrum</i> | common knotweed | |
| <i>Polygonum lapathifolium</i> | willow smartweed | |
| * <i>Polygonum ramosissimum</i> | bushy knotweed | ER |
| <i>Pterostegia drymarioides</i> | granny's hairnet | |
| * <i>Rumex acetosella</i> | sheep-sorrel | |
| * <i>Rumex crispus</i> | curly dock | |
| * <i>Rumex pulcher</i> | fiddle dock | |

Portulacaceae-Purslane Family

| | |
|----------------------------------------|---------------------|
| <i>Calandrinia ciliata</i> | red maids |
| <i>Calyptridium monandrum</i> | common calyptridium |
| <i>Claytonia parviflora parviflora</i> | |
| <i>Claytonia perfoliata perfoliata</i> | miner's lettuce |

Primulaceae-Primrose Family

| | |
|-----------------------------|-------------------|
| * <i>Anagallis arvensis</i> | scarlet pimpernel |
|-----------------------------|-------------------|

Ranunculaceae-Buttercup Family

| | |
|-------------------------------------------|----------------------|
| <i>Clematis lasiantha</i> | virgin's bower |
| <i>Clematis ligusticifolia</i> | yerba de chiva |
| <i>Delphinium cardinale</i> | cardinal flower |
| <i>Delphinium parryi parryi</i> | Parry's larkspur |
| <i>Delphinium patens patens</i> | larkspur |
| <i>Ranunculus aquatilis</i> | stream buttercup |
| <i>Ranunculus californicus</i> | California buttercup |
| <i>Ranunculus cymbalaria saximontanus</i> | desert buttercup |
| <i>Thalictrum fendleri polycarpum</i> | meadow-rue |

Rhamnaceae-Buckthorn Family

| | |
|-------------------------------------------------------|-----------------------|
| <i>Ceanothus greggii perplexans</i> | cupleaf-lilac |
| <i>Ceanothus leucodermis</i> | chaparral whitethorn |
| <i>Ceanothus oliganthus oliganthus</i> | hairy-leaf ceanothus |
| <i>Rhamnus tomentella tomentella (californica t.)</i> | chaparral coffeeberry |
| <i>Rhamnus ilicifolia</i> | holly-leaved redberry |
| <i>Rhamnus crocea</i> | spiny redberry |

Rosaceae-Rose Family

| | | |
|--------------------------------------------|------------------------------|----|
| <i>Adenostoma fasciculatum</i> | chamise | |
| ^{Sl} <i>Amelanchier utahensis</i> | Utah service-berry | ER |
| <i>Cercocarpus betuloides betuloides</i> | birth-leaf mountain-mahogany | |
| <i>Fragaria vesca</i> | wild strawberry | |
| <i>Heteromeles arbutifolia</i> | toyon | |
| <i>Potentilla glandulosa glandulosa</i> | sticky cinquefoil | |
| <i>Prunus ilicifolia ilicifolia</i> | holly-leaf cherry | |
| <i>Prunus virginiana demissa</i> | western choke cherry | ER |
| <i>Rosa californica</i> | California rose | |
| * <i>Rubus laciniatus</i> | cut-leaf blackberry | |
| <i>Rubus ursinus</i> | California blackberry | |

Rubiaceae-Madder or Coffee Family

| | | |
|-------------------------------------------|----------------------|--|
| <i>Galium andrewsii andrewsii</i> | phlox-leaf bedstraw | |
| <i>Galium angustifolium angustifolium</i> | narrow-leaf bedstraw | |
| <i>Galium aparine</i> | bedstraw | |
| <i>Galium nuttallii nuttallii</i> | San Diego bedstraw | |

Salicaceae-Willow Family

| | | |
|------------------------------------|-------------------------|----|
| <i>Populus fremontii fremontii</i> | western cottonwood | |
| <i>Salix exigua</i> | narrow-leaf willow | ER |
| <i>Salix gooddingii</i> | Goodding's black willow | ER |
| <i>Salix laevigata</i> | red willow | |
| <i>Salix lasiolepis</i> | arroyo willow | |
| <i>Salix lucida lasiandra</i> | shining willow | |

Saururaceae – Lizard-tail Family

| | | |
|------------------------------|-------------|--|
| <i>Anemopsis californica</i> | yerba mansa | |
|------------------------------|-------------|--|

Saxifragaceae-Saxifrage Family

| | | |
|-----------------------------------|---------------|----|
| <i>Lithophragma heterophyllum</i> | woodland star | ER |
| <i>Lithophragma affine</i> | woodland star | |

Scrophulariaceae-Snapdragon Family

| | | |
|------------------------------------------------|--------------------------|----|
| <i>Antirrhinum coulterianum</i> | Coulter's snapdragon | |
| <i>Antirrhinum nuttallianum nuttallianum</i> | Nuttall's snapdragon | |
| <i>Castilleja applegatei martinii</i> | desert Indian paintbrush | |
| <i>Castilleja exserta exserta</i> | purple owl's clover | |
| <i>Collinsia childii</i> | Child's blue-eyed mary | ER |
| <i>Collinsia heterophylla</i> | Chinese houses | |
| <i>Collinsia parviflora</i> | blue-eyed mary | |
| <i>Cordylanthus rigidus setigerus</i> | dark-tip bird' beak | |
| <i>Keckiella antirrhinoides antirrhinoides</i> | yellow bush penstemon | |
| <i>Keckiella ternata ternata</i> | summer bush penstemon | |
| <i>Limosella acaulis</i> | southern mudwort | |
| <i>Mimulus aurantiacus</i> | bush monkey flower | |
| <i>Mimulus brevipes</i> | slope semaphore | ER |
| <i>Mimulus cardinalis</i> | scarlet monkey flower | |
| <i>Mimulus guttatus</i> | seep monkey flower | |
| ^{Sl} <i>Mimulus palmeri</i> | Palomar monkey flower | ER |

| | | |
|--------------------------------------------|----------------------|----|
| <i>Mimulus pilosus</i> | downy monkey flower | |
| <i>Penstemon centranthifolius</i> | scarlet bugler | |
| <i>Penstemon spectabilis spectabilis</i> | showy penstemon | |
| <i>Scrophularia californica floribunda</i> | California bee plant | |
| <i>Veronica anagallis-aquatica</i> | water speedwell | |
| <i>Veronica peregrina xalapensis</i> | Mexican speedwell | ER |

Simaroubaceae-Quassia or Simarouba Family

| | | |
|----------------------------|----------------|----|
| <i>Ailanthus altissima</i> | Tree-of-Heaven | ER |
|----------------------------|----------------|----|

Solanaceae-Tomato Family

| | | |
|-------------------------|---------------------|--|
| <i>Datura wrightii</i> | Jimsonweed | |
| <i>Solanum parishii</i> | Parish's nightshade | |

Tamaricaceae-Tamarisk Family

| | | |
|--------------------|---------------------|--|
| <i>Tamarix</i> sp. | tamarisk/salt cedar | |
|--------------------|---------------------|--|

Urticaceae-Nettle Family

| | | |
|----------------------------------|--------------|--|
| <i>Urtica dioica holosericea</i> | hoary nettle | |
|----------------------------------|--------------|--|

Valerianaceae-Valerian Family

| | | |
|------------------------------------|------------|--|
| <i>Plectritis ciliosa insignis</i> | Plectritis | |
|------------------------------------|------------|--|

Verbenaceae-Vervain Family

| | | |
|------------------------------------------|---------|--|
| <i>Verbena lasiostachys lasiostachys</i> | vervain | |
|------------------------------------------|---------|--|

Violaceae-Violet Family

| | | |
|--------------------------|-----------------|--|
| <i>Viola douglasii</i> | Douglas violet | |
| <i>Viola pedunculata</i> | Johnny jump-up | |
| <i>Viola purpurea</i> | mountain violet | |

Monocots

Agavaceae-Agave Family

| | | |
|-----------------------|-------------------|--|
| <i>Yucca whipplei</i> | Our Lord's candle | |
|-----------------------|-------------------|--|

Cyperaceae-Sedge Family

| | | |
|------------------------------|-----------------------|--|
| <i>Carex fraxa</i> | fragile-sheath sedge | |
| <i>Carex multicaulis</i> | many-stem sedge | |
| <i>Carex prae-gracilis</i> | cluster field sedge | |
| <i>Carex subfusca</i> | rusty sedge | |
| <i>Cyperus</i> sp. | | |
| <i>Cyperus squarrosus</i> | beard flatsedge | |
| <i>Eleocharis acicularis</i> | spike sedge | |
| <i>Scirpus americanus</i> | American bulrush | |
| <i>Scirpus microcarpus</i> | small-fruited bulrush | |

Hyacinthaceae-Hyacinth Family

Chlorogalum parviflorum soap plant

Iridaceae-Iris Family

Sisyrinchium bellum blue-eyed grass

Juncaceae-Rush Family

| | | |
|-----------------------------------------|----------------------|----|
| <i>Juncus effusus pacificus</i> | Pacific rush | |
| <i>Juncus macrophyllus</i> | long-leaf rush | |
| <i>Juncus mexicanus</i> | Mexican rush | |
| <i>Juncus oxymeris</i> | pointed rush | |
| <i>Juncus phaeocephalus paniculatus</i> | brown-head rush | |
| <i>Juncus rugulosus</i> | wrinkled rush | |
| <i>Juncus tiehmii</i> | Kellogg's dwarf rush | WR |
| <i>Luzula comosa</i> | common wood-rush | |

Juncaginaceae-Arrow-grass Family

Lilaea scilloides flowering quill wort

Lemnaceae-Duckweed Family

Lemna miniuscula duckweed

Liliaceae-Lily Family

| | |
|------------------------------|------------------------|
| <i>Calochortus concolor</i> | golden-bowl mariposa |
| <i>Calochortus splendens</i> | splendid mariposa lily |
| <i>Calochortus weedii</i> | Weed's mariposa lily |

Orchidaceae-Orchid Family

Corallorhiza maculata spotted coralroot ER

Poaceae-Grass Family

| | | |
|------------------------------------|----------------------|----|
| <i>Achnatherum coronatum</i> | giant stipa | |
| <i>Achnatherum speciosum</i> | desert needlegrass | |
| * <i>Agrostis viridis</i> | water bent | |
| * <i>Aira caryophyllea</i> | hairgrass | |
| <i>Aristida purpurea longiseta</i> | red three-awn | ER |
| * <i>Avena barbata</i> | slender wild oat | |
| * <i>Briza minor</i> | quaking grass | ER |
| <i>Bromus carinatus carinatus</i> | California brome | |
| * <i>Bromus diandrus</i> | ripgut/foxtail grass | |
| <i>Bromus grandis</i> | large brome | |
| * <i>Bromus hordeaceus</i> | soft chess | |
| * <i>Bromus madritensis rubens</i> | foxtail chess | |
| * <i>Bromus tectorum</i> | cheat grass | |
| * <i>Bromus trinii</i> | Chilean chess | ER |
| * <i>Cynodon dactylon</i> | Bermuda grass | |
| * <i>Cynosurus echinatus</i> | hedgehog dogtail | |
| <i>Distichlis spicata</i> | saltgrass | WR |

| | | |
|--------------------------------------------|---------------------------|----|
| <i>Elymus elymoides</i> | squirreltail | |
| <i>Elymus glaucus glaucus</i> | blue wildrye | |
| <i>Elymus multisetus</i> | big squirreltail | |
| <i>Elymus trachycaulis trachycaulis</i> | slender wheatgrass | ER |
| * <i>Gastridium ventricosum</i> | nit grass | |
| <i>Hordeum brachyantherum californicum</i> | California barley | |
| * <i>Hordeum murinum leporinum</i> | barley | |
| <i>Koeleria macrantha</i> | junegrass | |
| * <i>Lamarckia aurea</i> | golden-top | |
| <i>Leymus condensatus</i> | giant wild rye | |
| * <i>Lolium perenne</i> | perennial ryegrass | |
| * <i>Lolium temulentum</i> | darnel | ER |
| <i>Melica frutescens</i> | tall melic | |
| <i>Melica imperfecta</i> | melic grass | |
| <i>Muhlenbergia rigens</i> | deergrass | |
| <i>Nassella cernua</i> | nodding needlegrass | |
| <i>Nassella pulchra</i> | purple needlegrass | |
| * <i>Paspalum dilatatum</i> | Dallis grass | |
| * <i>Phalaris minor</i> | littleseed canary grass | |
| <i>Poa pratensis pratensis</i> | Kentucky bluegrass | |
| <i>Poa secunda secunda</i> | one-sided bluegrass | |
| * <i>Polypogon interruptus</i> | ditch beard grass | |
| * <i>Polypogon monspeliensis</i> | annual beard grass | |
| * <i>Schismus barbatus</i> | Mediterranean beard grass | |
| * <i>Vulpia myuros hirsuta</i> | vulpia | |
| <i>Vulpia octoflora</i> | vulpia | |

Potamogetonaceae-Pondweed Family

| | | |
|------------------------|----------|--|
| <i>Potamogeton</i> sp. | pondweed | |
|------------------------|----------|--|

Themidaceae-Brodiaea Family

| | | |
|----------------------------------------------------|--------------------|----|
| <i>Bloomeria crocea</i> | goldenstar | |
| ^{sl} <i>Brodiaea terrestris kernensis</i> | dwarf brodiaea | ER |
| <i>Dichlostemma capitatum capitatum</i> | wild blue hyacinth | |
| <i>Muilla maritima</i> | common muilla | WR |

Typhaceae-Cattail Family

| | | |
|--------------------------|------------------|--|
| <i>Typha domingensis</i> | southern cattail | |
|--------------------------|------------------|--|

Appendix 5

PRE-2003 CEDAR FIRE PLANT COMMUNITY CLASSIFICATION OF THE SANTA YSABEL RANCH PRESERVE

This community classification is the result of field work conducted on the preserve in the years of 2002 and 2003. As of November 2003, about one-third of the East Ranch had been burned.

Even though this constitutes part of the final product for this project, as with all plant community classifications, they are always a "work in progress" and this one should be considered the same. Refinements, improvements, discussion, etc. are welcome. I hope it at least acts as a more accurate basis for plant community classification for the east "backcountry" of San Diego County.

Major Type and Subcategories

Many of the plant communities listed as subcategories intergrade. Species with * are non-native. Plant Species of Interest are denoted as "SI". The elevation gradient on the East Ranch ranges from 2980-4292 feet (908- 1293 meters) and on the West Ranch, the gradient is 2780-3636 feet (847-1108 meters).

Community types are those that seem to most closely resemble those identified from Modified Holland (MoH) (Oberbauer 1996) and the California Natural Diversity Database (CNDDDB 2002). The CNDDDB classification is much more "fine grained" than Modified Holland and many more CNDDDB types may be listed than MoH types. If there is no CNDDDB or MoH type indicated, it is most likely because at this time, no category is listed for this community type under these two systems.

Forest and Woodlands

Mixed Oak/Coniferous/Bigcone Fir/Coulter Pine-MoH 84500
CNDDDB 71.100.00

Coniferous Forest Types

Found on north-facing slopes as locally dominant and mixed with other tree species listed below.

Bigcone Douglas Fir (*Pseudotsuga macrocarpa*)
CNDDDB 82.100.00

Occurred in scattered stands.

Coulter Pine (*Pinus coulteri*)
CNDDDB-71.010.14, CNDDDB 87.090.00, 87.210.00

Incense Cedar (*Calocedrus decurrens*)
CNDDDB-71.010.21, 85.100.00, 85.100.03, CNDDDB 85.000.00

Associate species: A large locally dominant stand of California barberry (*Mahonia aquifolium dictyota*) occurred on the eastern edge of the cedar forest. This was unique for the area.

Oak Woodland/Forest Types-MoH 71100
CNDDDB 71.000.00

Found on all slope aspects and mixed with other tree species listed above and below.

Mixed Oak Woodland/Forest-MoH 77000 and 81300
CNDDDB 71.010.13, 71.100.00 (includes 13 subcategories; possible subcategories, 71.100.04, 71.100.06, and 71.100.08)

Black Oak (*Quercus kelloggii*)/Woodland Forest-MoH 71120 and 81340
CNDDDB 71.010.00 (this category includes 21 subcategories; possible subcategories, 71.010.01, 71.010.08, 71.010.12, 71.010.13, 71.010.14, 71.010.15, 71.010.18, 71.010.19, 71.010.21)

Observed on north-facing slopes

Associate species include: poison oak (*Toxicodendron diversilobum*), snowberry, (*Symphoricarpos mollis*), California rose (*Rosa californica*), western chokecherry (*Prunus virginiana demissa*), Utah serviceberry (*Amelanchier utahensis*).

Coast live oak (*Quercus agrifolia*) woodland/forest MoH 71160, 71161 and 71162 and 81300 and 81310
CNDDDB 71.060.00 (this category includes 25 subcategories; possible subcategories, 71.060.02, 71.060.09, 71.060.12, 71.060.13, 71.060.14, 71.060.17, 71.060.18, 71.060.19, 71.060.20, 71.060.22, 71.060.23

Primary associate species include: poison oak (*Toxicodendron diversilobum*) and snowberry, (*Symphoricarpos mollis*)

Engelmann Oak (*Quercus engelmannii*)^{Sl} woodland/savanna-MoH 71180 and 71181
CNDDDB 71.070.00 and 71.070.01

Observed on north-east, east, south, and southwest-facing slopes.

Hybrid Engelmann oaks were also observed that appear to have hybridized with scrub oak (*Quercus berberidifolia*).

Golden cup oak (*Quercus chrysolepis*)-MoH 81320
CNDDDB 71.050.00 (includes 19 subcategories; possible subcategories include: 71.050.04, 71.050.11, 71.050.12, 71.050.17, 71.050.19)

Woodland herb-no types
CNDDDB-no types

Occurred in the understory of oak woodland

Dominant species included: shield fern (*Dryopteris arguta*) , sword fern (*Polystichum imbricans*), larkspur (*Delphinium parryi parryi*, syn. with *patens patens*), *bedstraw (*Galium aparine*), Chinese houses (*Collinsia heterophylla*), Child's blue-eyed mary (*C. childii*), baby blue eyes (*Nemophila menziesii integrifolia*), sweet cicely (*Osmorhiza brachypoda*), miner's lettuce (*Claytonia perfoliata perfoliata*), chain fern (*Woodwardia fimbriata*), wild cucumber (*Marah macrocarpus m.*) woodland star (*Lithophragma heterophylla*), Indian paintbrush (*Castilleja applegatei martinii*), honeysuckle (*Lonicera subspicata*), poison oak (*Toxicodendron diversilobum*), snowberry, (*Symphoricarpos mollis*), meadow rue (*Thalictrum fendleri polycarpum*), Johnny jump up (*Viola pedunculata*), clovers (*Trifolium spp.*- tree clover (*Trifolium ciliolatum*), tom-cat clover (*Trifolium willdenovii*)), California buttercup (*Ranunculus californicus*), Douglas microseris (*Microseris douglasii platycarpha*), and silver puffs (*Uropappus lindleyi*).

Shrub-dominated Communities

Chaparral

Chamise (*Adenostoma fasciculatum*)-MoH 37200, 37210

CNDDDB 37.100.00, 37.101.00 (includes 12 subtypes; possible subtypes: 37.101.01, 37.101.03, 37.101.05, 37.101.07, 37.101.09, 37.101.12) 37.103.00, 37.103.01, 37.104.00, 37.104.01, 37.104.02, 37.104.03, 37.104.04, 37.104.06, 37.105.00, 37.105.01, 37.106.00, 37.106.01, 37.106.02, 37.106.03, 37.106.06, 37.106.08

Found on all slope aspects

Co-dominant and associate species include: Cleveland sage (*Salvia clevelandii*)^{SI}, Palmer's sage (*Salvia x palmeri*), white sage (*Salvia apiana*), buckwheat (*Eriogonum fasciculatum* and *polifolium*), manzanita (*Arctostaphylos glandulosa adamsii*), mountain mahogany (*Cercocarpus betuloides*), saw-tooth golden bush (*Hazardia squarrosa*), yellow pincushion plant (*Chaenactis glabriuscula glabriuscula*), silver puffs (*Uropappus lindleyi*), deerweed (*Lotus scoparius*), buck lotus (*Lotus crassifolius crassifolius*), wooly blue curls (*Trichostema parishii*), bush monkey flower (*Mimulus aurantiacus*), sacapellote (*Acourtia microcephala*), California peony (*Paeonia californica*), grassland gilia (*Gilia angelensis*), shining lomatium (*Lomatium lucidum*), wooly-fruit lomatium (*Lomatium dasycarpum*), chaparral pea (*Lathyrus vestitus alfeldii*), stinging lupine (*Lupinus hirsutissimus*), nightshade (*Solanum parishii*), wild cucumber (*Marah macrocarpus m.*), mariposa lily (*Calochortus spp.*), suncups (*Camissonia spp.*), mock parsley (*Apiastrum angustifolium*), wild heliotrope (*Phacelia distans*), Parry's phacelia (*Phacelia parryi*), scarlet bugler (*Penstemon centranthifolius*), clematis (*Clematis spp.*), soap plant or amole (*Chlorogalum parviflorum*). Grasses included Melica (*Melica imperfecta*) and giant stipa (*Achnantherum coronatum*).

"Selaginella balds" were found throughout on granitic outcrops covered with Bigelow's spike-moss (*Selaginella bigelovii*) and other true moss species. Lamarckia or goldentop (*Lamarckia aurea*) was also found in these areas growing in fissures. These "balds" were often associated with seeps.

Fimbriate chorizanthe (*Chorizanthe fimbriata*) and filago (*Filago spp.*) occurred in openings in the chaparral and other habitats.

Mixed-Montane Chaparral-MoH 37510
CNDDB-37.300.00, 37.301.00, 37.301.01

More common on the West Ranch. Species include a higher predominance of manzanita and ceanothus and many listed above. Dominant or co-dominant species include: bigberry manzanita (*Arctostaphylos glauca*), whitebark ceanothus (*Ceanothus leucodermis*), toyon (*Heteromeles arbutifolia*), brickellia (*Brickellia californica*), holly-leaved redberry (*Rhamnus ilicifolia*), holly-leaved cherry (*Prunus ilicifolia* i.), summer bush penstemon (*Keckiella ternata*).

Scrub oak (*Quercus berberidifolia*) dominated chaparral MoH-37900
CNDDB-37.406.00 (six subtypes; possible subtypes: 37.406.01, 37.406.04),
37.407.00 (six subtypes; possible subtypes: 37.407.02, 37.407.03, 37.407.04, 37.407.06)
37.408.00 (four subtypes; possible subtypes: 37.408.01, 37.408.02; 37.409.00
37.409.02, 37.410.00, 37.410.01

Associate species: chamise (*Adenostoma fasciculatum*), mountain mahogany, white-bark ceanothus (*Ceanothus leucodermis*), wild cucumber (*Marah macrocarpa*), nightshade (*Solanum parishii*) and sacapellote (*Acourtia microcephala*).

White sage (*Salvia apiana*) dominated chaparral/scrub
CNDDB 32.030.00

Observed in large locally dominant stands on west and south facing slopes.

Co-dominant and/or associate species: buckwheat (*Eriogonum fasciculatum fasciculatum* and *Eriogonum fasciculatum polifolium*) and mountain mahogany (see below).

Mountain mahogany (*Cercocarpus betuloides*)
CNDDB 37.600.00, 37.600.01, 37.610.00, 37.610.01

Forms locally dominant stands.

Co-dominant and/or associate species: California buckwheat (*Eriogonum fasciculatum fasciculatum* and *E.f. polifolium*) and white sage (*Salvia apiana*).

Inland Sage Scrub Component-Moh 32520
CNDDB-32.010.00

California Sagebrush (*Artemisia californica*)

On the West Ranch, chamise chaparral co-occurred with California sagebrush (*Artemisia californica*). Locally dominant patches of California sagebrush were more common on West Ranch on south-southeast-southwest-facing slopes.

Matchweed (*Gutierrezia sarothrae*)-45100, 45120, 32520
CNDDB-45.310.00

This community type is a challenging one to categorize. It includes elements of chaparral "scrub" and montane meadow and oftentimes would be transitional between meadow

and scrub. Matchweed is the dominant species. Community subtypes would often intergrade. They were observed on south, southwest, south-south-west and east-facing slopes.

Species common within all three subtypes include: white sage (*Salvia apiana*), tall buckwheat (*Eriogonum elongatum elongatum*), cudweed aster (*Lessingia filaginifolia filaginifolia*), California fuchsia (*Epilobium canum latifolium*), *ripgut grass (*Bromus diandrus*), *foxtail chess (*Bromus madritensis rubens*), *wild oat (*Avena barbata*), mule ears (*Wyethia ovata*), *tower mustard (*Arabis glabra glabra*), blue-eyed grass (*Sisyrinchium bellum*), San Diego gumplant (*Grindelia hirsutulla hallii*)^{SI}, white-tipped birds beak (*Cordylanthus rigidus setigerus*), checker mallow (*Sidalcea malvaeflora sparsifolia*), *filaree (*Erodium botrys* and *Erodium cicutarium*), lacinate spineflower (*Chorizanthe fimbriata laciniata*), linanthus (*Linanthus liniflorus*), tree clover (*Trifolium ciliolatum*), yellow pincushion plant (*Chaenactis glabriuscula glabriuscula*), desert plantain (*Plantago patagonica*), purple owl's clover (*Castilleja exserta exserta*), slender cottonweed (*Micropus californicus*), Gilia (*Gilia angelensis*), junegrass (*Koeleria macrantha*), big squirreltail (*Elymus multisetus*), bluegrass (*Poa secunda* and subspecies), *nit grass (*Gastridium ventricosum*), and scattered clumps of needlegrass (*Nassella cernua*).

Matchweed-California Buckwheat (*Eriogonum fasciculatum polifolium* and *fasciculatum*)
No CNDDDB type

California buckwheat is a co-dominant with matchweed.

Matchweed-Wright's Eriogonum (*Eriogonum wrightii membranaceum*)
CNDDDB 32.041.00

Wright's Eriogonum is a co-dominant with matchweed.

Matchweed-Three Awn (*Aristida purpurea longisetata*)-Buckwheat
CNDDDB-no type

The native grass three-awn would co-occur with matchweed. Other associate within this type included Wright's hymenothrix (*Hymenothrix wrightii*)^{SI}. Big squirreltail (*Elymus multisetus*) was observed co-occurring within this type also.

Wetland

Riparian and wetland types intergrade.

Wetland-Riparian herbaceous-MoH 52420 and 52430
CNDDDB-52.000.00 and 52.100.03

Species that tend to be confined to the Santa Ysabel creekbed usually within coast live oak riparian woodland.

Pacific Rush (*Juncus effusus pacificus*)
CNDDDB-45.561.00, 45.560.00, 45.562.02, 45.565.00

Forms major component of riparian habitat and extends into meadow and

woodland at times.

Dominant and associate species include: rushes (*Juncus* spp.), sedges (*Carex* spp.), Pacific oenanthe (*Oenanthe sarmentosa*), *white water cress (*Rorippa nasturtium-aquaticum*), marsh buttercup (*Ranunculus cymbalaria saximontanus*), *rabbit-foot grass (*Polypogon interruptus* and *Polypogon monospermiensis*), spike-sedge (*Eleocharis* sp), seep monkey flower (*Mimulus guttatus*), chain fern (*Woodwardia fimbriata*), hedge nettle (*Stachys ajugoides rigida*), willow herb (*Epilobium ciliatum ciliatum*, syn. with *adenocaulon*), mint (*Mentha* spp.), speedwell (*Veronica anagallis-aquatica*, **Veronica arvensis*), red maids (*Calandrinia ciliata*), water buttercup (*Ranunculus aquatilis*), California buttercup (*Ranunculus californicus*), Indian sweetclover (*Melilotus indica*), Durango root (*Datisca glomerata*), hoary nettle (*Urtica dioica holosericea*), flatsedge (*Cyperus squarrosus*), *sheep sorrel (*Rumex acetosella*), knotweed (*Polygonum* sp.), cocklebur (*Xanthium strumarium*), small-fruit bulrush (*Scirpus microcarpus*), silver mugwort (*Artemisia ludoviciana ludoviciana*), douglas mugwort (*Artemisia douglasiana*), southern cattail (*Typha domingensis*), scarlet or marsh monkeyflower (*Mimulus cardinalis*), Spanish clover (*Lotus purshianus purshianus*), cudweed aster (*Lessingia filaginifolia* f.), everlasting (*Gnaphalium canescens microcephalum*), Dallis grass (**Paspalum dilatatum*), and little quaking grass (*Briza minor*).

Locally dominant stands of horsetail (*Equisetum hyemale*) occurred.

Flowering quill wort (*Lilaea scilloides*), yerba mansa (*Anemopsis californica*) and saltgrass (*Distichlis spicata*), were found more commonly on the West Ranch.

Pondweed (*Lemna minuscula*)

CNDDB-52.105.00

Forms locally dominant "stands" on open water or pools.

Sedge Meadow-MoH 52440, 52430, 52420

CNDDB-45.100.00

Dominant species include: cluster field sedge (*Carex praegracilis*) and/or fragile-sheath sedge (*Carex fracta*).

Mixed Wet Meadow-MoH 45110

CNDDB-45.565.00, 42.060.00, 42.060.01, 42.060.05, 45.310.12

Mexican or wire rush (*Juncus mexicanus*) was one of the dominant rush species on the preserve and grew in the wettest section of the access roads. Pacific rush was also locally dominant.

Other dominant or associate species include: other rush species, wrinkled rush (*Juncus rugulosus*), Kentucky bluegrass (*Poa pratensis*), meadow barley (*Hordeum brachyantherum californicum*), sedges species listed above, bulrush (*Scirpus* sp.), San Bernardino aster (*Aster bernardinus*), San Diego gumplant (*Grindelia hirsutula hallii*)^{SI}, four-spot clarkia (*Clarkia purpurea quadrivulnera*), dock (*Rumex* spp.), miner's lettuce (*Claytonia parviflora* p.), shining peppergrass (*Lepidium nitidum nitidum*), hoary nettle (*Urtica dioica holosericea*), vervain (*Verbena lasiostachys lasiostachys*), red-maids

(*Calandrinia ciliata*), California buttercup (*Ranunculus californicus*), Johnny jump-up (*Viola pedunculata*), and blue wildrye (*Elymus glaucus* g.),

Kanaka Flats Alluvial Drainages
CNDDB-45.560.00?

Kanaka Flats, which is on the East Ranch, is a large upland terrace system consisting of a series of drainages or draws, some of which drain into small basins or ponds. Species from the mixed wet meadow occur within these areas but also: pointed rush (*Juncus oxymyris*), brown-head rush (*Juncus phaeocephalus paniculatus*), *mustard (*Barbarea* sp.), and dense-flower boisduvalia (*Epilobium densiflorum*).

Seep or "perched wetlands"
CNDDB-45.300.00, 45.700.00

These were isolated wetlands often 'uphill' in between grades of the slope on terraces. Most were located on the upper slopes on the east end of the East Ranch where the property borders BIA and Rutherford property.

Characteristic species include: Pacific rush (*Juncus effusus pacificus*), San Diego gumplant (*Grindelia hirsutula hallii*)^{sl}, bulrush (*Scirpus* spp.), chain fern (*Woodwardia fimbriata*), umbels, seep monkey flower (*Mimulus guttatus*), dock (*Rumex* sp.), California rose (*Rosa californica*), coffeberry (*Rhamnus tomentella tomentella*), and hoary nettle (*Urtica dioica holosericea*).

Ponds-MoH 52440?
CNDDB-?

Various ponds occur on the preserve, all former stock or retention ponds. Additional species found here include: Flowering quill wort (*Lilaea scilloides*), bract popcorn flower (*Plagiobothrys bracteatus*), mudwort (*Limosella acaulis*), and *African brass buttons (*Cotula coronopifolia*).

Riparian

Coast Live Oak Riparian Woodland-MoH 61300 and 61310
CNDDB- 71.060.20

Associate species include: western sycamore (*Platanus racemosa*).
CNDDB- 61.300.00, 61.310.00, 61.312.00, 61.312.01, and 61.312.02
61.312.01

One of the distinguishing features of the preserve is the old-growth trees, sycamores being some of the most impressive. Many of these trees have circumferences greater than 6 feet in diameter. They should be inventoried and protected. Many old growth coast live oak trees have also been observed.

Dominant and associate species include:*cut-leaf blackberry (*Rubus laciniatus*), California blackberry (*Rubus ursinus*), Sierra currant (*Ribes nevadense*), and bitter gooseberry (*Ribes amarum*)^{sl}.

Of note, three western azalea (*Rhododendron occidentale*)^{SI} shrubs have been located on the banks of Santa Ysabel Creek on the East Ranch. One was severely grazed. It could be grazed from cattle, deer or both. A small population of dogwood (*Cornus sericea sericea*) was discovered just to the east of one of the western azalea shrubs (Waypoint 108).

White Alder (*Alnus rhombifolia*) forest-MoH 61510
CNDDDB-61.312.00, 61.400.00, 61.420.00, 61.420.09, and 61.420.10

Forms locally dominant stands. Dead trees are evident in many of these stands.

Willow scrub-MoH 63320
CNDDDB-63.130.00, 63.100.00, 63.900.00

Locally dominant stands of: narrow-leaf willow (*Salix exigua*), arroyo willow (*S. lasiolois*), red willow (*S. laevigata*), Goodding's willow (*S. gooddingii*) and shining willow (*S. lucida lasiandra*).

Co-dominant species include: mulefat (*Baccharis salicifolia*), false indigo (*Amorpha fruticosa*) and coffeeberry (*Rhamnus tomentella tomentella* syn. with *californica* ssp. *tomentella*).

Upland Herbaceous Communities

These plant communities often intergraded.
Native grassland-MoH 42100, 42110, 42400
CNDDDB-41.000.00

All form locally dominant stands.

Junegrass (*Koeleria macrantha*)/One-sided Bluegrass (*Poa secunda secunda*)
CNDDDB-41.180.00, 41.181.00

This type was located on a Julian schist outcrop in a sort of "pebble plains" physiognomy.

Associate species include: matchweed (*Gutierrezia sarothrae*), foothill needlegrass (*Nassella cernua*), blue-eyed grass (*Sisyrinchium bellum*), purple sanicle (*Sanicula bipinnatifida*), four-spot clarkia (*Clarkia purpurea quadrivulnera*), slender cottonweed (*Micropus californicus*), purple owl's clover (*Castilleja exserta exserta*), plectritis (*Plectritis ciliosa*), California buttercup (*Ranunculus californicus*), and San Diego gumplant (*Grindelia hirsutula hallii*)^{SI}.

California brome (*Bromus carinatus carinatus*) occurred infrequently in locally dominant stands.

Melica (*Melica imperfecta*) grassland
Forms locally dominant stands.

Needlegrass (*Nassella cernua*)-MoH 42110
CNDDDB-41.140.00, 41.150.00, 41.150.02, and 41.150.03

Associate species include: blue-eyed grass (*Sisyrinchium bellum*), matchweed (*Gutierrezia sarothrae*), purple sanicle (*Sanicula bipinnatifida*), four-spot clarkia (*Clarkia purpurea quadrivulnera*), slender cottonweed (*Micropus californicus*), purple owl's clover (*Castilleja exserta exserta*), plectritis (*Plectritis ciliosa*), California buttercup (*Ranunculus californicus*), San Diego Gumplant (*Grindelia hirsutula hallii*)^{Sl}, and one-sided bluegrass (*Poa secunda* s.)

Giant Stipa (*Achnatherum coronatum*)
CNDDDB- 41.170.00

Forms locally dominant stands in chaparral, scrub and meadow.

Deergrass (*Muhlenbergia rigens*)
Forms locally dominant stands. Found on north-north-west and west facing slopes.

Blue Wild Rye (*Elymus glaucus glaucus*)
CNDDDB- 41.640.00 and 41.640.01

Observed on north-east-facing slope in understory of oak forest (coast live, black with scattered Coulter pine).

Squirreltail (*Elymus elymoides*)
CNDDDB-41.230.00

Forms locally dominant stands

Native Grassland/Wildflower Meadow

Found on east-facing slopes.

Needlegrass/Wildflower Meadow-MoH 42300
CNDDDB-41.000.00, 41.140.00, 41.150.00, and 41.290.00

Dominant species include nodding needlegrass (*Nassella cernua*). Associate species include: matchweed (*Gutierrezia sarothrae*), purple owl's clover (*Castilleja exserta exserta*), desert plantain (*Plantago patagonica*), purple sanicle (*Sanicula bipinnatifida*), blue-eyed grass (*Sisyrinchium bellum*), San Diego gumplant (*Grindelia hirsutula hallii*), lacinate spineflower (*Chorizanthe fimbriata laciniata*), California buttercup (*Ranunculus californicus*), California goldenrod (*Solidago californicus*), and goldenstar (*Bloomeria crocea crocea*).

In 2003, bulb plants were predominant while in 2002, few were observed. Bulb species observed included: splendid mariposa lily (*Calochortus splendens*), Weed's mariposa lily (*C. weedii*), golden-bowl mariposa lily (*C. concolor*), and locally dominant dwarf brodiaea (*Brodiaea terrestris kernensis*)^{Sl}. These species were found in herbaceous and shrub communities.

Three Awn Grassland (*Aristida purpurea longiseta*)
(Also see Matchweed Type)

Found on south south-west facing slopes

Associate species include: matchweed (*Gutierrezia sarothrae*), blue-eyed grass (*Sisyrinchium bellum*), desert plantain (*Plantago patagonica*), purple owl's clover (*Castilleja exserta exserta*), Wright's hymenothrix (*Hymenothrix wrightii*)^{sl}, lacinate spineflower (*Chorizanthe fimbriata laciniata*), San Diego gumplant^R (*Grindelia hirsutula hallii*), mule ears (*Wyethia ovata*), cudweed aster (*Lessingia filaginifolia* f.), and white-tipped birds beak (*Cordylanthus rigidus setigerus*). Big squirreltail (*Elymus multisetus*) co-occurred with some populations of three-awn.

Non-native grassland-MoH 42200

CNDDb: 42.000.00, 42.026.00, 42.026.01, 42.026.03, 42.040.02

Dominant species include: *ripgut grass (*Bromus diandrus*). Probably the most predominant plant community on the preserve. In some areas, forms extensive monotypic stands.

Non-native Grassland/Wildflower Meadow-MoH 42300

CNDDb: 41.290.00, 42.026.00, 42.026.01, 42.026.03, 45.100.00?

Observed on north-east-facing slope

Dominant species include: *ripgut grass (*Bromus diandrus*), *soft chess (*B. hordeaceus*), *foxtail chess (*B. madritensis rubens*), wild barley (*Hordeum murinum leporinum*), and *wild oat (*Avena barbata*).

Associate species include: *filaree (*E. botrys* and *E. cicutarium*), matchweed (*Gutierrezia sarothrae*), blue dicks (*Dichlosterema capitatum capitatum*), checker mallow (*Sidalcea malvaeflora sparsifolia*), San Diego sweet pea (*Lathyrus vestitus alfeldii*), woolly-fruit lomatium (*Lomatium dasycarpum dasycarpum*), western wallflower (*Erysimum capitatum capitatum*), *bedstraw (*Galium aparine*), fringe-pod (*Thysanocarpus curvipes*), lotus (*Lotus hamatus*), clovers (*Trifolium* spp.- tree clover (*Trifolium ciliolatum*), tom-cat clover (*Trifolium willdenovii*)), purple owl's clover (*Castilleja exserta exserta*), plectritis (*Plectritis ciliosa*), California buttercup (*Ranunculus californicus*), meadow rue (*Thalictrum fendleri polycarpum*), mule ears (*Wyethia ovata*), goldenrod (*Solidago californica*), yarrow, (*Achillea millefolium*), four-spot clarkia (*Clarkia purpurea quadrivulnera*), San Diego gumplant (*Grindelia hirsutula hallii*)^{sl}, goldenstars (*Bloomeria crocea*), heliotrope (*Phacelia imbricata patula*), elegant madia (*Madia elegans elegans*), silver puffs (*Uropappus lindleyi*), Douglas microseris (*Microseris douglasii platycarpa*), white-tipped birds beak (*Cordylanthus rigidus setigerus*), linanthus (*Linanthus liniflorus*), cudweed aster (*Lessingia filaginifolia* f.), Johnny jump-up (*Viola pedunculata*), purple fleabane (*Erigeron foliosus foliosus*), larkspur (*Delphinium parryi parryi*, syn. with *patens patens*), sweet cicely (*Osmorhiza brachypoda*), *squirreltail grass (*Cynosurus echinatus*), nodding needlegrass (*Nassella cernua*) and wild blue rye (*Elymus glaucus* g.).

Ruderal/Non-native grassland-MoH 11300 and 18310

CNDDb- 42.026.00 (01-03), 42.020.00 (01.02), 42.025.00, 45.100.00?

Dominant and associate species include: *filaree (*E. botrys* and *E. cicutarium*), *ripgut grass (*Bromus diandrus*), *foxtail chess (*Bromus madritensis rubens*), cheatgrass (*Bromus tectorum*), wild barley (*Hordeum murinum leporinum*), bluegrass (*Poa* sp.),

*western ragweed (*Ambrosia psilostachya*), *squirreltail grass (*Cynosurus echinatus*), *smooth cat's ear (*Hypochaeris glabra*), *hairy cats-ear (*Hypochaeris radicata*), *short-pod mustard (*Hirschfeldia incana*), California mustard (*Guillenia lasiophylla*), checker mallow (*Sidalcea malvaeflora sparsifolia*), four-spot clarkia (*Clarkia purpurea quadrivulnera*), white-tipped birds beak (*Cordylanthus rigidus setigerus*, California buttercup (*Ranunculus californicus*), purple sanicle (*Sanicula bipinnatifida*), fringe-pod (*Thysanocarpus curvipes*), Johnny jump-up (*Viola pedunculata*), *tower mustard (*Arabis glabra glabra*), red maids (*Calandrinia ciliata*), purple owl's clover (*Castilleja exserta exserta*), yarrow (*Achillea millefolium*), goldenrod (*Solidago californica*), narrow-leaf milkweed (*Asclepias fascicularis*) and California milkweed (*Asclepias californica*), California thistle (*Cirsium occidentale*), bird's nest thistle (*Cirsium scariosum* syn. with *tioganum*), silver mugwort (*Artemisia ludoviciana ludoviciana*), lotus (*Lotus* spp.- *Lotus hamatus*), clovers (*Trifolium* spp.), miniature lupine (*Lupinus bicolor*), and grape soda lupine (*Lupinus excubitus austromontanus*).

Locally dominant species that form "colonies" or "thickets" within this community type include California rose (*Rosa californica*), snowberry (*Symphoricarpos mollis*), and squawbush (*Rhus trilobata*).

Fascicled tarweed (*Deinandra fasciculata*) formed locally dominant populations in this and other herbaceous communities. It was evident only in 2003.

Wildflower Meadow-MoH 42300
CNDDDB-41.290.00 and 45.100.00?

Dominant species include: cudweed aster (*Lessingia filaginifolia filaginifolia*), yarrow (*Achillea millefolium*), checker mallow (*Sidalcea malvaeflora sparsifolia*), goldenrod (*Solidago californica*), silver mugwort (*Artemisia ludoviciana* L.), Indian paintbrush (*Castilleja applegatei martinii*), shiny lomatium (*Lomatium lucidum*), *squirreltail grass (*Cynosurus echinatus*).

Ruderal/Agricultural-MoH 11300 and 18310

Dominant species include: *western ragweed (*Ambrosia psilostachya*)

Associate species: *filaree (*E. botrys* and *E. cicutarium*), *ripgut grass (*Bromus diandrus*), *cheatgrass (*Bromus tectorum*), wild barley (*Hordeum murinum leporinum*), silver mugwort (*Artemisia ludoviciana* L.), blue elderberry (*Sambucus mexicana*), *short-pod mustard (*Hirschfeldia incana*), *tumble mustard (*Sisymbrium officinale*), *horehound (*Marrubium vulgare*), *tower mustard (*Arabis glabra glabra*), doveweed (*Eremocarpus setigerus*), *black medick (*Medicago lupulina*), bracken fern (*Pteridium aquilinum pubescens*), California buttercup (*Ranunculus californicus*), vinegar weed (*Trichostema lanceolatum*), yarrow (*Achillea millefolium*), narrow-leaf milkweed (*Asclepias fascicularis*), California milkweed (*Asclepias californica*), California thistle (*Cirsium occidentale*), bird's nest thistle (*Cirsium scariosum* syn. with *tioganum*), white-tipped bird's beak (*Cordylanthus rigidus setigerus*), Spanish clover (*Lotus purshianus* p.), and coyote melon (*Cucurbita foetidissima*).

Species of interest in this type: Palmer's sagewort (*Artemisia palmeri*)^{SI}. Locally dominant species that form "colonies" or "thickets" within this community type include California rose (*Rosa californica*) and squawbush (*Rhus trilobata*).

Disturbed-MoH 11300

Includes areas currently or historically disturbed from cattle or human activity Includes all dirt access roads.

Filaree is literally everywhere on the preserve and includes **Erodium botrys* and **E. cicutarium*.

Other non-native grasses include *Bermuda grass (*Cynodon dactylon*) which occurs in small patches near dirt roads and *vulpia (*Vulpia myuros hirsuta*).

*Crete head (*Hedypnois cretica*) was commonly distributed on the West Ranch. Pockets of *Schismus grass (*Schismus barbatus*) were appearing in the west Ranch. This plant can become a serious pest and dominant.

The dirt roads were being recolonized by successional species. Desert plantain (*Plantago patagonica*) was dominant in the dirt roads on the preserve. It co-occurred with slender cottonweed (*Micropus californicus*), laciniate spineflower (*Chorizanthe fimbriata laciniata*), linanthus (*Linanthus liniflorus*), navarretia (*Navarretia atractyloides*), and white-tipped birds beak (*Cordylanthus rigidus setigerus*).

White tipped birds beak (*Cordylanthus rigidus setigerus*) is dominant along the road edges on the preserve.

San Diego gumplant (*Grindelia hirsutula hallii*)^{SI} grows in the dirt roads and was far more common on the East Ranch than the West Ranch. Descanso milkvetch (*Astragalus oocarpus*)^{SI} was also found growing in the dirt roads on the East Ranch. It was not observed within the dirt roads on the West Ranch.

Exotic Plants

*Tree-of-Heaven (*Ailanthus altissima*) occurs in large dominant stands within Santa Ysabel Creek and in the adjacent areas.

*Tamarisk (*Tamarix* sp.) Only a few plants were observed but all were on Santa Ysabel Creek. It was found on both Ranchs. At this point, can probably be removed from the preserve completely if these are eradicated soon.

*One Catalpa tree (*Catalpa speciosa*) was observed along the creek growing near a stand of Ailanthus (Waypoint 106).

Unique Types

Unique plant communities are Three-awn-Hymenothrix meadows, the upper terrace mosaic of wetland/drainages on Kanaka Flats, wet meadows, perched wetlands, and those plant communities associated with the exposed outcrops of Julian schist. These communities included Koeleria-Bluegrass(Poa)-Needlegrass grassland with Matchweed-Wright's buckwheat. Monotypic stands of western choke cherry (*Prunus virginiana demissa*) were found on exposed Julian schist outcrops.

Appendix 6

Summary of selected publications on native grasslands, non-native grasses and proper management of both

There exists considerable debate concerning goals of and methods for the management of southern California grasslands. One area of particular contention is the debate concerning the use of prescribed grazing as a management tool. Some ranchers and rangeland managers claim that cows are good for the land. Some biologists disagree. The summary below suggest that cattle grazing may be an effective ecological management tool, but that it must be done carefully and with constant monitoring.

This summary is premised upon two central assumptions: 1) that grazing by cattle can severely alter riparian and wildland areas; and 2) that management actions that favor native grasses are preferable over those that encourage introduced annual grasses. Native grass genera represented on the preserve and some mentioned in the paper summaries below are: the needlegrasses (*Nassella* spp. or still called *Stipa* by some), wild ryes (*Elymus* spp.), native barley (*Hordeum brachyantherum*), deergrass (*Muhlenbergia rigens*), melic grass (*Melica* spp.), desert needlegrasses (*Achnatherum* spp.), a native brome (*Bromus carinatus*), native poas such as Malpais grass (*Poa secunda*), and the native bent grasses (*Agrostis* spp.).

Selected Papers

Publication: Proceedings: California Exotic Pest Plant Council Symposium--Vol 4. 1998

Author: Andrew Sanders, UC-Riverside Herbarium

Title: Invasive Exotics in California: a perspective from inland S. California

Bromus rubens and *Bromus diandrus* were introduced in S. California in grain fields near San Bernardino in 1886 and 1888. They have spread rapidly in this time and now seriously threaten wildlands.

"I'm always surprised to hear comments that imply that exotics may not be all the serious, or that the threat by some of the commoner species has not been established. A case in point is the influence of the annual grasses, particularly *Bromus diandrus* and *B. rubens* and *Avena barbata* on the vegetation and flora of southern California. None of the three abundant weeds is included on the CalEPPC weed lists, yet all are among the most severe pest species in southern California and are plants that we need to draw the most attention to and for which control measures most need to be found."

Publication: Terrestrial Vegetation of California, Chapter 14, John Wiley and Sons, New York.

Authors: Editors: M. Barbour and J. Major

Chapter 14 is by Harold Heady, UC-Berkeley

Title: Valley Grassland, pp.491-510

"I believe that plant succession tended toward perennial bunch grass dominants on nearly all well-drained upland sites, that numerous annual species were present, and that they dominated intermediate and low successional stages just as they do in many other grasslands. Also, I believe that introduced annual plants prevent many perennial grasses from attaining their dominance, that annuals are now a large part of the climax

on many sites (if not all of it) and that alien species should be considered as new and permanent members of the grassland rather than as aliens. Their elimination from the California prairie is inconceivable."

"Into this situation came the introduced annuals, which were widely adapted to the Mediterranean climate and to the local soil, which were resistant to grazing, and which offered high competition to the perennials (citation). Their passage through the dry summers in the seed stage enhanced their advantage over the perennials, especially during the dry years. Evidence exists that some of the grassland became dominated by *Avena* (wild oat) before heavy grazing by domestic livestock occurred. Cultivation and other types of soil disturbance completely removed the perennials from many areas. The introduced annuals returned quickly after the abandonment of cultivation and held the land, preventing return of the perennials. Many factors contributed to the replacement of the perennials with introduced annuals, not the least being the competitive ability of the annuals under varying conditions of weather and grazing (citation). Replacement of the perennial grassland resulted not from a single cause of sequence, but from several causes operating together.

Complete absence of livestock is about the only situation that sometimes permits the reinvasion of perennial grasses. No livestock means no grazing by any large animals as herd of elk and pronghorn antelope no longer exist. Removal of all livestock now may be as disruptive to pristine conditions as the presence of too many livestock (citation). Whether the perennial grasses will return on all ungrazed sites remain a question. Other than *Poa scabrella*, few perennial grass species can be found after 40 yr. without grazing in the livestock-free area on the San Joaquin Experimental Range. Scattered plants and small stands of several perennial species developed in 10-15 yr. without livestock grazing on the Hopland Field Station. *Stipa pulchra* (purple needlegrass) cannot be found in areas with abundant annual grasses on Hastings reservation, although it does occur in oak woodland. The stands of *S. pulchra* in La Jolla Valley near Oxnard remained after many decades of various kinds of use and have invaded the former cultivated fields and pastures in the valley center (citation). *Stipa pulchra* abundantly appeared in one pasture on the Hopland Field Station after restriction of sheep grazing to the winter season. It decreased in the same pasture after spring, summer, and fall grazing a few years later.

Determination of the characteristics of the pristine valley grassland must not overshadow concern for the present and the future. Grassland ecologists should recognize that species labeled as "introduced" and "alien" cannot be removed and perhaps not even reduced from their present state. For example, *Bromus mollis* (soft chess) and *Avena fatua* (wild oat) usually increase when heavy grazing is reduced. They dominate on numerous soil types and over large areas. Regardless of whether managerial concerns consider them desirable or undesirable, they cannot be eliminated under any known range management practice. Cultivation may remove them from the center of the field, but they remain at the edges. Ecologists and others should recognize these as "new natives".

Publication: Fremontia 20:1 pp. 3-11

Author: S. W. Edwards

Title: Observation on the Prehistory and Ecology of Grazing in California

Objective of author is to show that livestock grazing can be ecologically beneficial, "if specific strategies are devised on the basis of site-by-site needs."

California grasslands were historically grazed by native ungulates and therefore have evolved with grazers.

Bunchgrasses can benefit from grazing in many ways. Grazing, mowing, cutting, or burning prevents accumulation of thatch. This benefits native grasses. One advantage non-native annual grasses have over native perennials is they can grow through this thatch layer. Observations in the Bay Area showed that with total exclusion of livestock, the areas converted to dominance by *Bromus diandrus* (foxtail or ripgut) and wild oats (*Avena* spp.). These tall fast-growing plants shade out the natives and snuff out native seedlings with thatch.

"It is unfortunate that overgrazing, which destroys biodiversity, gives grazing a bad name. But it is important to recognize that the livestock themselves are not culpable for inadequate land management practices."

Publication: Journal of the American Society of Agronomy, 1944, 36:699-703

Authors: R. Merton Love

Title: Preliminary Trials on the Effect of Management on the Establishment of Perennial Grasses and Legumes at Davis, California

Different grazing treatment in the spring following seeding of perennial grasses and legumes led to the following results:

- Early, intensive grazing, before the annuals set seed reduced competition for the perennials. Animals were then removed. A short period of grazing in the fall did not harm the young perennial plants.
- Late grazing, beginning when annuals were maturing (setting seed) reduced stands of perennial grasses by about 80% and perennial legumes by about 50%. Prolonged grazing into the dry season had negative effects on species seeded-in.
- Late mowing, following by prolong grazing, resulted in the poorest stand of perennials.

Publication: Madrono, 50:1, Jan-March 03, pp. 8-14

Authors: J.S. Fehmi and J.W. Bartolome

Title: Impacts of livestock and burning on the spatial patterns of the grass, *Nassella pulchra* (Purple Needlegrass)

Effects of different treatments produced:

- burning significantly increased clump size.
- grazing decreased clump size.
- litter impedes growth of purple needlegrass.
- burning can decrease total populations of adjacent exotic annual grasses.
- selective grazing increases heterogeneity of spatial environment.
- simple management approach does not work.
- a mix is suggested (grazing, foot traffic, exclosures, burning).

Publication: Grasslands (Publication of the California Native Grass Association, 13:3, Summer 03

Author: W. James Barry, Senior State Park Ecologist, Calif State Parks and Rec

Title: California Primeval Grasslands and Management in the State Parks System.

"Restoration of native grassland ecosystems requires careful site specific analysis of soil, aspect, microclimate, and existing vegetation. Also important are historical uses and regional flora and fauna."

Publication: Madrono, 2002, 49:4, pp.274-284

Authors: J.G. Hamilton, J.R. Griffin and M.R. Stromberg, Hamilton-Dept of Ecology, UC-SB and Griffin and Stromberg-Museum of Vertebrate Zoology, UC, Carmel Valley

Title: Long-term Population Dynamics of Native Nassella (Poaceae) Bunchgrasses in Central California.

"California bunchgrass communities are one of the most endangered ecosystem types in the U.S."

Study focuses on observations of *Nassella* in unmanaged stands (i.e. natural). Landscape level, *Nassella* has increased. Population dynamics are related to land-use history. Non-native annuals did not seem to affect *Nassella* stands. Light grazing did. Cultivated areas showed decreased coverage of *Nassella*. Small plants died most often. No active management of *Nassella* stands in areas uncultivated may be needed while active management may be needed for those areas that have historically undergone cultivation.

Publication: Madrono, 2001, 48:4, pp. 230-235

Author: S. Reynolds, J.D. Corbin, C. D'Antonio

Title: The Effects of Litter and Temperature on the Germination of Native and Exotic Grasses in a Coastal California Grassland.

Paper explored effects of litter and temperature on seed germination of both kinds of grasses. Non-native species used were perennials, *Festuca arundinacea* and *Holcus lanatus*. Most common annual species were *Avena barbata* (on preserve), *Bromus diandrus* (on preserve-most serious non-native pest grass on preserve), and *Vulpia myuros* m. (on preserve) Native species were *Deschampsia caespitosa holciformis*, *Festuca rubra*, *Calamagrostis nutkaensis* and *Nassella pulchra*.

The exotic perennial species exhibited superior germination percentages compared to native perennial species in all three litter treatments (bare, light and heavy). *Festuca arundinacea* had the greatest germination over all four of the native species. Regarding germination, exotic annual grasses had the highest germination and exotic and native perennial species had the lowest in all three temperature treatments (warm, normal and cold). *Vulpia m.m.* and *Bromus diandrus* and one native perennial, *Festuca rubra*, had the greatest germination rates while *H. lanatus* had the lowest germination rate in all three treatments. Temperatures 5° C below the average temperatures for the region substantially reduced the germination response of *Bromus diandrus* and *Festuca arundinacea* relative to the other species.

Species specific patterns of germination over time were observed. In warm and average temperatures, the three exotic annual species were the fastest to germinate. In cold temps, two of the three (*Vulpia* and *Avena*) were still the first to germinate. *Bromus diandrus* had extremely low germination. The two exotic perennials (*Festuca* and *Holcus*) germinated more rapidly than the native perennials. In an interesting finding, though the native perennial *Festuca rubra* showed a 60% higher germination rate than *Holcus lanatus*, the *Holcus* seedlings emerged more quickly than the *Festuca rubra* seedlings.

"While the germination percentage of exotic species seed was consistently higher than that of native species, we predict that individual species capacity to germinate and therefore, to become established, will vary from year to year and habitat to habitat according to differences in litter cover and climatic conditions."

Publication: Fremontia, 1998, 26:4, pp. 13-18

Authors: C M. D'Antonio and K. Haubensak

Title: Community and Ecosystem Impacts of Introduced Species

Certain plant species can permanently alter the local fire regime. These species in the intermountain west are the brome grasses (such as *Bromus tectorum* and *Bromus madritensis rubens*). It was 30-40 years ago that ecologists noted the invasion of *B. tectorum* (cheatgrass) increased fire frequencies leading to an increased invasion of more cheatgrass. This has been recently confirmed by Steve Whisenant at Texas A & M University. Red brome (*B. madritensis rubens*) and other annual invasive increase fire frequencies in the western Mojave desert. Dr. Rich Minnich and his students at UC-Riverside have documented destructive fires fueled by these grasses in areas where fire was previously rare.

(Moran's observational note: many of the areas along Sunrise Highway burned in last years massive fire have now been recolonized by red brome and cheatgrass where there once was chaparral. Moran has been hiking and observing this area as a recreational hiker for about 15 years. These invasive exotics are definitely increasing their local range since the fires. Whether it will equal a type conversion will be determined over time).

Publication: Fremontia, 1998, 26:4, pp.39-43

Authors: J. Gerlach, A. Dyer, and K. Rice

Title: Grassland and Foothill Woodland Ecosystems of the Central Valley

Recent experiments have shown purple needlegrass seedlings (*Nassella pulchra*) growing with annual grasses die in much greater numbers, grow more slowly, and take much longer to reproduce than they do when growing without competition from annual grasses. Early studies by Heady, Young and Evans suggest that annual grasses are strong competitors for light and soil moisture. Dyer's results show that annual grasses rapidly increase in height and leaf area during early spring and commonly reduce light levels at the soil surface to less than 10% of full sunlight. Purple needlegrass could not grow under these conditions and many died soon after germination. Others lingered but succumbed to the summer drought. Annual grasses have to do their thing quickly and exploit the environment prior to the dry season while it typically takes native perennials longer to establish and thrive. These different strategies when the two co-occur has implications for "who wins."

Publication: Madrono, 1999, 46:1 pp. 13-19

Author: M. Brooks, UC-Riverside

Title: Alien Annual Grasses and Fire in the Mojave Desert

"Alien annual grasses contributed most to the continuity and amount of dead annual plants and to the spread of summer fires. Fire spread rapidly (12 m/min) and continuously across interspaces with *Bromus*..."

Publication: Madrono, 1999, 46:1 pp. 25-37

Author: M.D. Meyer and P. M. Schiffman, CSU-Northridge

Title: Fire Season and Mulch Reduction in a California Grassland: a comparison of restoration strategies

Late-spring and fall burning significantly increased the cover and diversity of native vegetation and decreased the cover and seed viability of alien grasses relative to the controls. Winter burns and reduction in mulch cover did not innerves the cover or diversity of native plants and were only moderately effective in reducing non-native plant cover. Fire season is a significant factor in grassland restoration and fire seasons must be determined by plant phenology, season-specific fire intensities and the potential removal of all mulch biomass. Warm-season burning, not cool-season burning or grazing, was the most effective approach for restoring native annual vegetation to California grasslands. Proper burning can eliminate the stored seeds of many non-native species (such as filaree [*Erodium*]).

Publication: Grasslands (Publication of the California Native Grass Association, 11:1, Spring 01

Author: P. Kephart, Rana Creek Habitat Restoration

Title: Resource Management Demonstration at Russian Ridge Preserve

Used five combinations of treatments including: hand control, tractor mowing, herbicides, grazing, burning, and planting native seed in combination with some of these treatments. Results:

- hand control is expensive and effects nearly incidental
- tractor mowing: reduced the non-natives
- herbicide: cost effective and reduced non-natives
- grazing: reduced target species (yellow star thistle-not a problem on the preserve, thank goodness) but increased other non-natives. Increased some natives. Results unclear
- burning: expensive, bureaucratic, paperwork but successful in bringing back natives. copy provided

Publication: same as above

Author: Kent Reeves, Board of Directors for the Society for Range Management, California Section, Lodi, CA

Presents two ecological premises: Premise 1: California perennial grasses need to be grazed to be healthy. Argument is these grasses evolved with "large herds of grazing ungulates" such as elk, pronghorn antelope and bighorn sheep. Argues livestock can be used as a tool to restore native perennial grasses. Premise 2: Trampling by hooves of cattle is very good for grasslands. Argument is can be beneficial if managed carefully. "Holistic (cattle) management or biological planning is not for everyone. People can choose to use it or not. It requires a dramatic change in management, and a commitment to understand the process and monitor it."

Publication: same as above, 12:4, Fall 2002

Author: Shannon Peters, Director of Research and Education, Reforestation Technologies International

Title: Mycorrhizal Inoculum: Evaluating Need and Performance in Revegetation and Reclamation Projects.

"The presence of mycorrhizae is believed to be a key factor in the succession of native grasses and their successful competition with alien weeds. In fact, the recruitment of seedlings and overall species diversity has been shown to decline in the absence of AM

(arbuscular mycorrhizal) fungi." Soil microflora, characteristics, nutrients, etc. are extremely important for the establishment of native flora including grasses.

Publication: same as above, 10:1, Winter 2000

Authors: C. S. Brown, K.J. Rice, V. Claassen, UC-Davis

Title: The effects of soil amendments and mulches on establishment of California native perennial grasses: a summary of selected results

Studied the effects of different types of straw mulch, compost and slow-release nitrogen fertilizer on the establishment and growth of California native perennial grasses. Species responded differently to the different treatments. "In summary, perennial grass performance was best with rice straw, was improved by the addition of nitrogen fertilizer in the presence of weeds and was not greatly affected by the addition of compost."

Publication: same as above, 9:3, Fall 1999

Authors: Wirka, J.

Title: The State of the Art: prescribed burning in California grasslands

"Like medical doctors who must consider all aspects of a patient's health, history, and sensitivity to drugs before prescribing treatment, managers and restoration ecologists will always have to take into account the particularities of their site before prescribing fire."

Publication: same as above, 6:4, December 1996

Authors: C.S. Brown and K.J. Rice

Title: Suppressive effects of Zorro fescue (*Vulpia myuros*) on California native perennial grasses.

"The evidence which has accumulated over the years clearly indicates that native perennial grasses are negatively affected by annual grasses.:

Stemming the Invasive Tide, USDA, USFS

Livestock Grazing on Western Riparian Areas, July 1990, Environmental Protection Agency



Western Azalea growing along Santa Ysabel Creek
on the East Ranch.